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WHITE SANDS — Page Five

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Under proper training even the most savage boy will rise above the bloody flesh and sport business . . . Godlike sympathy grows and thrives and spreads far beyond the teachings of churches and schools, where too often the mean, blinding, loveless doctrine is taught that animals have neither mind nor soul, have no rights that we are bound to respect, and were made only for man, to be . . . slaughtered or enslaved.—JOHN MUIR.



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The National Parks Association

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guarding America's heritage of scenic wilderness

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DEVEREUX BUTCHER, Editor

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NATIONAL PARKS MAGAZINE, formerly National Parks Bulletin, has been published since 1919 by the National Parks Association. It presents articles of importance and of general interest relating to the national parks and monuments, and is issued quarterly for members of the Association and for others who are interested in the preservation of our national parks and monuments as well as in maintaining national park standards, and in helping to preserve wilderness. (See inside back cover.)

Letters and contributed manuscripts and

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Olympic National Primeval Park—"Once logging is introduced—no matter how selectively—the delicate balance of nature is disrupted."

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TWO PARKS DEDICATED

ON June 15, Secretary of the Interior Krug made an address dedicating the Olympic National Primeval Park. The ceremony, attended by officials of the National Park Service and by interested people from many parts of the country, was held at Crescent Lake within the park.

Local lumber interests recently have attempted to find excuses for having the park's magnificent forests opened to logging. To wilderness enthusiasts it is encouraging to note that in his address, Secretary Krug made it plain that he is abiding by the policies of his predecessor, Mr. Ickes, and that the park will continue to be preserved in its primeval condition. The address was in part as follows:

"This is the twenty-sixth national park established by Congress. It is one of the great areas of America, and has already become one of the most important of the reservations set aside for the enjoyment and inspiration of all our people. It is the greatest asset of the Olympic Peninsula and will become increasingly so. But it has far more than local significance. It belongs to the nation; and therefore the nation has the responsibility so to protect and administer it as to keep its beauty and its greatness unspoiled.

"Can we preserve too much of this kind of beauty in America?

"There are those who say that the Olympic National Park is too large—that it takes in too much merchantable timber which, if released, would prolong the life of the logging companies and mills of the region. That issue, it seems to me, was decided by Congress in 1938, when, after prolonged debate, it authorized the preservation of a maximum of 898,292 acres. Congress, which also has decreed 'the preservation from all injury or spoliation of all timber' in the park, alone possesses authority to modify its decision of eight years ago.

"I have been asked to make some of this forest available for commercial use, but, of course, I have no authority to do so, under the law. I am convinced that such forest as

that which gives Olympic National Park outstanding distinction must be preserved, if future generations of Americans are to have the privilege of savoring its wilderness grandeur. This is one of the remaining great stands of virgin timber, and we should be very slow to deprive succeeding generations of the best example of primeval forests that once were so extensive.

"It is, I realize, difficult today to determine what future generations will judge adequate or excessive; but it would seem better to err on the side of too much rather than too little.

"It is suggested that the park be selectively logged for its 'ripe' timber; that the park forests would be improved by such cutting. Even if the basic park act would permit it, I cannot concede that for park purposes, this forest would thus be 'improved.' The national park concept—maintenance of natural conditions—precludes those practices designed to produce the greatest returns on commercial products. Once logging is introduced—no matter how selectively—the delicate balance of nature is disrupted.

"I recognize the importance of the lumber industry. I know, too, that no fair decision on such matters can be made which refuses to give due consideration and proper weight to its local effects. However, I wish to declare, unequivocally, my conviction that, where questions affecting a national park are concerned, the interest of the nation as a whole is paramount.

"Having in mind the nation's needs, we can justify setting aside for preservation only the extraordinary examples of virgin forest, such as we have in this park. There is in all the National Park System only a little more than one percent of the forested lands of the United States, while the entire System contains only 85/100 of one percent of our total land area. Surely this fraction of one percent is not too much of our native landscape to hold intact as nature created it. I doubt if it is nearly enough. Other countries, realizing the value of this concept of land use, are seeking advice from us on how to establish national parks. Some are starting too late; much of their perishable natural beauty has been long destroyed. We in America have

not started too late, as Olympic National Park attests. But the endeavor—much of which I must recognize as honest and sincere—to reduce the gains made by the great conservationists of the past, requires us to match their vision by defending what they have won for us and for our children.

"The Department of the Interior, of which the National Park Service is an important part, and I as Secretary of the Interior, have a deep concern that in the management of the Department's affairs, which touch at so many points on the utilization of our natural resources, all resources shall be wisely used. That is the essence of conservation. I am certain that the lands and their resources included in national parks and monuments are not 'locked up.'

"Part of the great spirit and broad vision of our pioneers came from the grandeur of the continent itself. It is little enough to ask that their children and generations yet unborn shall be able to know, through national parks, something of the pristine glory of their country. Whatever the future may bring, our descendants will rejoice in this great symbol of the beauty and glory of America."

On August 27, a ceremony marking the dedication of Isle Royale National Primeval Park was held within the park. Speakers included Representative Frank E. Hook and Governor Harry F. Kelley, both of Michigan. Under Secretary of the Interior Oscar L. Chapman represented the federal government in accepting Isle Royale into the National Parks System. Regional Director Lawrence Merriam of the National Parks Service acted as presiding officer. Mr. Chapman spoke in part as follows:

"Except for the intervention of war, these ceremonies would have taken place several years earlier. How better could we state our desire for a peaceful future than by dedicating these islands to the people of the United States, for their perpetual enjoyment?"

"Isle Royale National Park is typical of the areas that have been given the exclusive

status of national parkhood. It is extensive, comprising the main island from which the park takes its name, the many satellite islands and islets that lie close to it, and the bays and immediately adjoining waters.

"To call the roll of the national parks is to recite a list of scenic marvels. These are your possessions and mine; but we possess them today only because there lived in the past and there are living in the present men and women who saw that portions of the America-that-was must be saved, so that we and those who follow us could have some sense of what our country was like when white men first glimpsed its vastness and grandeur.

"The act that authorized the establishment of Isle Royale National Park was signed by President Hoover on March 3, 1931, but it was not until April of 1940 that the deed to the last acre of privately owned land within the authorized boundaries of the park was accepted by the federal government, and full national park status was given. All of us owe thanks to the State of Michigan and to numerous private donors for the fact that we have in Isle Royale one national park in which the National Park Service is not plagued with any private land problem, with all that that can mean in lack of adequate control of use and inability to protect valuable natural resources against impairment or destruction.

"The original advocate of the proposal to make this a national park was the late George E. Miller of the Detroit News, whose hopes have been carried on for years by Mr. Albert Stoll, Jr., the conservation editor of that newspaper. The Hon. Louis C. Cramton, former member of the House of Representatives, and Senator Vandenberg, share honors for having successfully carried through both houses of Congress the act authorizing this park.

"I am proud to accept this area on behalf of the United States, and to pledge the Department of the Interior and the National Park Service, as your trustees, to maintain it in the tradition that has made our system of national parks one of the nation's crowning glories."

The Reserve Fund, established to give the Association permanent financial stability, now stands at \$22,000. The goal is \$200,000. Donations are deductible from federal income tax returns.

WHITE SANDS

By NATT N. DODGE

WHAT is so dear to the heart of childhood as the backyard sandpile? Simplest of toys, it combines fresh air and sunshine with a challenge to the muscles, stimulus to the imagination, and a between-the-toes thrill that lasts a lifetime. And the larger the sandpile, the more fun.

Perhaps that is the reason why Uncle Sam's biggest sandpile attracted more than 79,000 men, women and children in 1941. Some built castles and laid out railroad grades and highway systems that the wind erased over night. Many slid off the precipitous sides of the dunes. Most of them went barefooted, and a few took sun baths. White Sands is America's perfect playground; there is nothing just like it anywhere else in the world.

Far out in south-central New Mexico, where the mirage and the dust-devil play, lies the Tularosa Basin, a flat-floored valley between two mountain ranges, the San Andreas on the west and the Sacramentos on the east. Near the middle of the valley is a miniature Sahara of sugar-like gypsum. Here are wave upon wave of chalky dunes, many of them as high as a three-story building and clean as the southwest wind that has shifted, shaped and sifted them. White Sands covers an area nearly four times the size of the District of Columbia, or 274 square miles.

Gypsum grains are not like the tiny grains of rock that constitute ordinary sand, but are much like particles of granulated sugar. It has a flat, musty taste something like Epsom salts. From it is made plaster-of-Paris, filler for paper and paint, wall plaster and stucco. It is used in cement, soundproof and fireproof tile, and in the manufacture of chalk for the schoolroom. One form of it is the beautiful alabaster of the sculptor. But those are all types of commercial gypsum, while the Great White Sands is *recreational*

gypsum. In January 1933, President Hoover proclaimed the area a national monument, forever withdrawn from commercial exploitation, to be used as a playground by the people of the United States.

Fifteen miles away is the quiet little town of Alamogordo (which in Spanish means "fat cottonwood") where is located the New Mexico School for the Blind. Did you ever see blind children play? They cannot run as do other boys and girls, for the slightest obstacle becomes a pitfall for unguided feet. No ball games for them; no tag, no pom-pom-pullaway! But frequently these children are loaded into cars and busses and whisked away to the Sands. Here everything is different. There are no twigs to trip them, no ditches to stumble into, no trees, no fences, no roads, no automobiles. At first it is hard for the children to realize their freedom from a bondage that only the blind can know. Gradually they push aside that instinctive, groping caution. Strange, happy calls arise. One of them, arms extended, is spinning around and around. Another takes a few clumsy running steps, stumbles over his own awkward feet, and laughing happily, rolls over and over in the soft, warm sand. A new freedom has been found. Of the White Sands, Superintendent P. A. Smoll of the school says, "This is one place where the children can cut loose with utter abandon and give vent to the natural tendency of youth to romp and play, that normally is utterly impossible for children who do not see."

But it is not necessary to be blind to get a thrill from the Sands. They are an incredible sight. It does not seem possible for sand to be so white. To northerners, the illusion of snow is so perfect that they instinctively feel something must be wrong with the temperature.

Driving over the dunes in an automobile

is comparable to a motorboat ride. To complete the comparison, it is possible to fasten a toboggan behind the car and go surfboard riding—or dune-bogganing—where a spill means neither a ducking nor, as in the case of snow, the chance of crashing into a buried log or boulder. The closest approach to a rock in the sands is an occasional lump caused by the heat of a campfire followed by rainwater soaking up the plaster-of-Paris and hardening it into a solid mass. To prevent this, the National Park Service has provided fireplaces for picnic and campfires. Elsewhere, fires are not permitted. Because of the danger of cars tipping over on steep leeward faces of the dunes, visitors are not permitted to drive over the sands except in a car especially equipped for the purpose, and operated by an experienced driver.

Scientists tell us the White Sands form the largest known surface deposit of gypsum in the world, an estimated thirteen billion tons. Where did all of this material come from, and why do we find it here? Geologists explain that the valley, now occupied by the Sands, was at one time as high or higher than the mountains which now lie to the east and west. Then, hundreds of thousands of years ago, some great movement of the earth's crust caused the huge section, which is now the Tularosa Basin, to settle. Water ran into this basin from all sides and dissolved quantities of the gypsum occurring in massive beds beneath the surface of the ground. Perhaps there was a lake in the basin at various times, but evaporation caused by the hot, dry air of the Southwest worked too fast for the lake, which gradually dried up. During rainy seasons the lake, called Lake Lucero, still forms, only to disappear in dry weather. With water evaporation, the "gyp," which is dissolved in it, crystallizes out in the form of selenite. The crystals are gradually broken up into finer and finer particles by wind and weather, and piled into dunes. As fast as rain and snow water seep down and dissolve more underground gypsum,



National Park Service

The yucca is one of seven plant species able to keep its leaves above encroaching dunes.

it works its way to the surface and evaporates, leaving more gypsum on top of the ground. Gypsum continues to enter the basin today in water seeping down through the gypsum beds in the mountains.

Gradually the White Sands are moving to the northeast under the impetus of the winds. Studies show that the rate of movement is only about eight inches a year. Therefore, the people of Alamogordo, twelve miles away, and right in the path of the dunes, are not preparing to abandon the city for several thousand years.

Although Alamogordo doesn't fear being buried alive by the dunes, some of the plant life of the White Sands is actually undergoing that fate. Since the water table is only a short distance below the surface of the ground, many varieties of plants that can endure the high gypsum content of the water gain a foothold in the soil between the dunes. Cottonwood trees, yucca and numerous other species thrive in the Sands. Gradually the dunes move forward, and many a luckless plant finds a huge dune relentlessly bearing down upon it. Some plants are killed, but others (seven species to be exact) put up a struggle to keep their heads above the encroaching wave. Longer and longer grow their stems as the sand piles up around them. With green leaves protruding above the tops of the drifts, their roots many feet below, send moisture up the elongated trunk or stem. As the crest of the dune passes, the sand level gradually drops again, leaving behind a most peculiar object. Roots put out by the elongated stem have so hardened the surrounding sand that it remains clinging to the stem as the dune moves on. It is a strange object indeed—a grey-white pinnacle surmounted by the green crown of the plant.

The plants and trees of the Sands are not the only living inhabitants that this peculiar environment has caused to assume characteristics not common elsewhere. Lizards and mice that live in the Sands are white. Mice of the same species found in areas outside the dunes, but away from the Sands, are grey or brown. Furthermore, mice of the same species, living in a black lava flow a few miles north of the White Sands, are black. Biologists say that a species showing different color characteristics in different environments illustrates nature's law of protective coloration. A white mouse among the black rocks of the lava beds would be as conspicuous as a white cat on a coal pile. Of course, a white cat on a coal pile wouldn't stay white very long; but according to the biologists it

has taken the mice of the lava beds many generations to change color to match their surroundings. The black mice and the white mice are now being studied at the University of Michigan.

Most people who visit this national monument marvel at the Sands themselves, and play in them; but as soon as the novelty has worn off a bit, they begin to wonder where the sand came from, and why it is white and different from other sand. They look around for somebody to ask about these unusual matters. To help answer the many questions, the National Park Service has built a museum at the edge of the dunes and has installed a number of exhibits explaining the origin of the Sands and its peculiar features. Park rangers are also on hand to answer questions.

New Mexico is loyal to the White Sands. It would like to make it possible for all of its citizens, particularly the children, to visit the monument every year. And so, perhaps, the state is a little envious of the town of Alamogordo and Otero County, in which the Sands are located, for the Alamogordo Chamber of Commerce each spring has a White Sands Playday. It invites all the children of the county, and also those of Las Cruces and El Paso, Texas, to come and play in the Sands. Schools in many of the towns and cities are closed, the children loaded into cars, busses and trucks, and taken to the White Sands to play. On April 5, 1941, the current Playday was held with nearly 5,000 children, teachers, parents, and old timers converging on the Sands.

Perhaps children of the heavily populated eastern part of the United States, who have studied their geographies, think of New Mexico as away out in the wilderness—the backyard of the United States, so to speak. But the children of New Mexico, especially of Otero County, are mighty glad to be out in the backyard, because (you've guessed it) that is where Uncle Sam keeps his biggest, and cleanest, and whitest sandpile.

NATIONAL NATURE MONUMENTS

ARCHES NATIONAL MONUMENT, situated in southeastern Utah, was established in 1939. It consists of five separate areas totaling fifty-four square miles. The name Arches is derived from the many natural arches formed by water, freezing and thawing, wind-blown sand and other forms of weathering in a 300-foot thick layer of red rock called the Entrada Sandstone. Geologists explain that the Entrada Sandstone has been cut by two series of master joints or cracks intersecting at right angles. These cracks pass through the entire thickness of the formation. For thousands of years, water entering the cracks has dissolved the sandstone, thereby enlarging the joints and leaving fissures between slabs or "fins" of rock that are sometimes less than twenty feet thick, yet more than a hundred feet high. It is in these fins that many of the arches have been formed. Once the fin has been perforated, weathering and the force of gravity enlarge the opening until it becomes an arch. Continued erosion wears it thinner until it falls, leaving remnants standing as buttresses at either end. All stages in the development and decay of such arches may be seen in the monument. The Windows section, reached by a nine-mile drive over an ungraded road that leaves U. S. Highway 160 twelve miles north of Moab, Utah, is the most accessible area in the monument. The main features here are Double Arch, Parade of the Elephants, North and South Windows and Turret Arch. In the Devil's Garden section are huge amphitheaters joined by twisting passageways among rows of gigantic fins in which erosion has cut steeples, towers, spires and arches. Of the eighty-one arches recorded in the monument, more than sixty occur in this section. Landscape Arch, believed to be the longest natural bridge in the world, has a span of 291 feet. The Delicate Arch is reached by a twenty-six mile drive from U. S. Highway 160 down the picturesque Salt Valley and a two mile hike from the end of the road. This arch is beyond description, with its unsurpassed setting of massive "slickrock" and precipitous cliffs. The Klondyke Bluffs section is directly west of the north end of the Devil's Garden and can be reached by a three mile hike. In this section are Tower Arch, Joseph Smith and the Golden Plates. The Courthouse Towers section can be reached by a two-mile walk from monument headquarters. This contains several massive walled canyons, the most spectacular being known as Park Avenue. Desert flowers are an added attraction during May and June with desert mallow, lupine, larkspur, pentstemon, yucca and various species of cacti. The animal life on the desert is sparse because of lack of water, but occasional glimpses may be had of coyote and fox. Deer and mountain lion are present in the upper elevations of the monument, and mountain sheep have been seen in one section.

Headquarters is five miles northwest of Moab, Utah, on U. S. Highway 160, and can be reached from Cortez, Colorado, on the south, or Crescent Junction, on U. S. Highway 50 on the north. Accommodations are not available in the monument, but there are modern cabins and a hotel at Moab. A through bus line runs from Albuquerque, New Mexico, to Salt Lake City, Utah, passing through Moab, and bus service is available from Thompsons, Utah, on the Denver and Rio Grande Western Railroad. Arrangements can be made in Moab for transportation to the monument, which is open all year.

THE ANTIQUITIES ACT (an act for the preservation of American antiquities), passed by Congress in 1906, provides under section 2, "That the President of the United States is hereby authorized, in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments. . . ." All of the national nature monuments herein described were created by Presidential proclamation under authority of this act. The act eliminates delay in placing under federal

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Tower Arch is but one of nature's massive architectural structures in Arches National Monument, Utah.

National Park Service

protection objects or areas of national importance that are being, or are about to be, despoiled. A number of areas thus have been saved from pending injury. It was the rapid exploitation of Arizona's petrified forest that influenced passage of the act.

BADLANDS NATIONAL MONUMENT, in southern South Dakota's White River Badlands, was set aside in 1939. It contains 207 square miles of unusually beautiful erosion. A number of the formations are as high as 300 feet, and are composed of layers of clay and sand washed from the Black Hills. They range in color from green, cream and yellow to pink. The erosion continues today with every rain. Bones have been found of such prehistoric animals as the saber-tooth tiger, the three-toed horse, and of ancestors of the rhinoceros, hog and camel that inhabited the swamps once covering this region. Although elk, Audubon bighorn sheep and bison lived here before the surrounding country was settled, these species have been extirpated. A few mule deer, as well as smaller mammals such as chipmunk, ground squirrel, prairie dog, badger, jack and cottontail rabbit, raccoon, skunk, red fox, bobcat and coyote are still to be found. Here also are such wild flowers as ground-phlox, pasque flower, wallflower, evening primrose, yellow pea, red mallow, mariposa lily, purple, blue and white

pentstemon, yucca and prickly pear cactus, the latter bearing blossoms of yellow and red. The principal tree is the Rocky Mountain cedar.

Headquarters is within the monument at Cedar Pass. Meals and cabins are provided at Cedar Pass Lodge, and lunches and supplies are obtainable at Pinnacles during the summer. Emergency gas, meals, and lodging can be obtained at Cedar Pass throughout the year. The monument is reached from the east over U. S. Highway 16 from Sioux Falls, South Dakota, to the junction with State Route 40 seven miles west of Kadoka, South Dakota. It is reached from the west also over U. S. Highway 16 from Rapid City, South Dakota, to Wall, where a road branches south six miles to the monument. The Chicago, Milwaukee, St. Paul and Pacific, and the Chicago and Northwestern railroads serve Rapid City. From June 1 to September 1 the Black Hills Transportation Company runs daily busses from Rapid City to the Badlands. The monument is open all year.

BLACK CANYON OF THE GUNNISON NATIONAL MONUMENT, established in 1933, covers twenty-two square miles embracing the deepest and most spectacular ten-mile section of the dark, formidable gorge of the Gunnison River. Ute Indians aptly describe this gorge—a distance of approximately fifty miles between Sapinero and Austin, Colorado,—as “the place of high rocks and much water.” Geologists consider the Black Canyon of the Gunnison River as probably the most remarkable bit of scenery in the entire San Juan Mountain region of Colorado. For several hundred million years the Gunnison River has been furiously carving its channel through the pre-Cambrian complex, the oldest matter in geologic history. The hills surrounding and rising above the canyon rims are of so much more recent origin than the rocks of the gorge itself that, during the gap of time thus represented, life developed from the single plant cell to the dinosaur. The rims of the gorge are only 1300 feet apart at the closest point, yet the gorge ranges from 1730 feet to 2425 feet in depth within the monument. At one location the river channel narrows to forty feet. In addition to this stupendous and spectacular gorge, the areas bordering both rims of the monument have unusual natural beauty. Dense scrub oak, juniper and some of the oldest pinyons (550 to 750 years old) known to tree-ring scientists cover the summit area, with Douglas fir growing in the canyon. Flowering shrubs such as serviceberry, mock orange and mountain mahogany are common. The monument is one of the last strongholds of the Rocky Mountain bighorn sheep, while the Rocky Mountain mule deer, elk, bear, mink, yellow-bellied marmot, badger and porcupine are found in abundance.

The monument is under the supervision of Mesa Verde National Park, and the address is Mesa Verde National Park, Colorado. Both rims of the monument are accessible by automobile during good summer weather. From Montrose, Colorado, the distance to the south rim is eight miles via U. S. Highway 50, and nine miles north over a graded road. The north rim is reached from State Route 92 just east of Crawford. There is no bus service to the reservation. A campground is maintained on each rim, and a park ranger is stationed there during the travel season. Supplies are not obtainable at the monument. Hotel and tourist-camp facilities are available in Montrose.

CAPITOL REEF NATIONAL MONUMENT, in south central Utah, established in 1937, comprises an area of fifty-one square miles. Situated in rugged desert country, the chief feature of the area is a buttressed cliff of highly colored sandstone that derives its name from white sandstone domes resting upon lower strata. Geologists say that the cliff is one of the finest known examples of what is termed a water pocket fold or monocline, which is the result of an upheaval of the earth's crust. This action is believed to have taken place several million years ago. Erosion has exposed the upturned layers of strata.

The area is administered by the superintendent of Zion National Primeval Park, and the address is Springdale, Utah. Its southern boundary lies along State Route 24 running south a hundred miles from U. S. Highway 50 at Green River, Utah, and east



Capulin Mountain, an extinct volcano in New Mexico, is believed by geologists to have last erupted as recently as two thousand years ago.

eighty-four miles from U. S. Highway 89 at Sigurd, Utah. There are no accommodations at the monument. Fruita, on State Route 24, is the nearest town. The monument is open all year.

CAPULIN MOUNTAIN NATIONAL MONUMENT, in northern New Mexico, created in 1916, comprises an area of about one square mile. The monument protects the large volcanic cinder cone for which the area is named, which rises 8215 feet above sea level, 1500 feet above the surrounding plain, and has a rim diameter of 1450 feet. The reservation is located in a large area of volcanic remains. Geologically this cone is of recent origin. According to geologists, it last erupted approximately two thousand years ago. From the rim, one can see in every direction the lava beds that flowed from the crater like molasses, forming waves and folds as they flowed over each other seeking lower levels. Unfortunately, the symmetry of the cone has been marred by a road to the summit. The road is visible from all points. Two major foot trails have been constructed, one around the rim on the crest, a distance of one mile, and the other from the end of the road to the bottom of the crater 400 feet below.

Headquarters is at the town of Capulin, New Mexico, three miles south of the monument. There are no accommodations for visitors, except at nearby towns. The monument is reached over U. S. Highway 64 from Capulin on the south, and from Raton, New Mexico, on the west over U. S. Highway 87, a distance of twenty-nine miles. Eight Greyhound busses pass through Capulin daily, four each way. Cars may be hired at Capulin, and between busses one may make the trip, which requires about two hours. The monument is open all year.

CEDAR BREAKS NATIONAL MONUMENT, in southwestern Utah, was created in 1933. Comprising an area of nine square miles, its chief feature is an amphitheater of eroded sandstone and limestone, the dominant color of which is bright orange-pink. Though having the same geological formation as Bryce Canyon National Primeval Park, it is more varied in color, but lacks the innumerable delicately carved spires of Bryce. The highest point of the amphitheater rim is 2000 feet above the lowest point in the eroded canyons below. Surrounded by the Dixie National Forest, it is located at an altitude of 10,400 feet above sea level on the Markagunt Plateau. It is a magnificent bit of mountain country where trees such as bristlecone or foxtail pine, white and alpine fir, Engelmann spruce and golden aspen are found. Among the many wild flowers of the area are larkspur, lupine and white columbine.

The monument is administered jointly with Zion National Primeval Park, and the address is Springdale, Utah. Cedar Breaks Lodge and cabins are open for visitors from June 1 to September 20. A campground is available to those who bring their own equipment. The monument is reached on State Route 14 east from U. S. Highway 91 at Cedar City, Utah, and west from U. S. Highway 89 which connects with State Route 14 twenty-four miles north of the Mt. Carmel Highway to Zion National Primeval Park. The Union Pacific Railroad leaves visitors at Cedar City, and from here the busses of the Utah Parks Company conduct tours to the monument en route to Zion and Bryce Canyon national primeval parks. The monument is open from about June 1 to November 1, depending on weather conditions.

CHANNEL ISLANDS NATIONAL MONUMENT, established in 1938, consists of Santa Barbara and Anacapa islands off the coast of Southern California, with a combined area of a little more than one and a half square miles. Sealions come to the island's beaches in large numbers, and there is an abundance of bird and plant life. Fossils have been found, including those of Pleistocene elephants. The islands, under joint administration with Sequoia National Primeval Park, California, have not yet been developed for visitors, and there is, therefore, no established boat service to them. Yachting parties sometimes stop there from the nearest mainland points which are Hueneme, San Pedro and other ports near Los Angeles.

CHIRICAHUA NATIONAL MONUMENT, in southern Arizona, was created in 1924 to protect sixteen square miles of brown and gray rhyolite monoliths that have eroded into weird shapes. Rhyolite is an acid volcanic rock, the lava form of granite. By these formations, which belong to the Tertiary Period, the geologic history of a million years is told. Geologists say that once the area was full of volcanic activity, and that molten basalt and rhyolite poured out over the level land. As the lava cooled, it shrank and cracked in patterns. Then, after all volcanic activity had ended, the heaving of the earth's crust tilted and lifted the cracked lava into mountains. This was followed by countless centuries of erosion, which formed the strange landscape of today with its monoliths, balancing rocks and canyons. Although there is a wealth of geologic interest, there is also much in the way of plant and animal life. Chiricahua is a mountain range rising from an arid grassland, with rain and winter snows providing moisture for vegetation and wildlife. The deep canyons and cool north slopes are clothed in green, while the dry southward facing slopes have plant life characteristic of the desert. There are several species of pine, two of juniper, Arizona cypress, madrone and six species of oak, manzanita, and among the plants there are several cacti, yucca, scarlet pentstemon, bovardia and century plant. Arizona white-tail deer are abundant, as well as numerous smaller mammals. Among the birds are the coppery-tailed trogon and the thick-billed parrot which sometimes come to the area from Mexico. Present also is the band-tailed pigeon, now becoming rare throughout its wide range because of killing by gunners.

Headquarters is within the monument, and the address is Dos Cabezas, Arizona. The Silver Spur Ranch at Dos Cabezas, a quarter mile from headquarters, provides accommodations for visitors, while free campgrounds are maintained in the monument for those who bring their own equipment. Saddle horses are available. Chiricahua is reached east from Tucson over U. S. Highway 80 to Benson, Arizona, and thence over State Route 86 and U. S. Highway 666 to Willcox, Arizona, where a branch road leads thirty-six miles southeast to the monument. The reservation is open all year.

COLORADO NATIONAL MONUMENT, established in 1911, is situated in west central Colorado. It consists of twenty-eight square miles of canyons with walls of eroded red sandstone carved by water and wind. The geologic origin of the sandstone,

the shales and the layer of black granite in the canyon walls tells a story covering millions of years of earth building. Monoliths and cliffs a thousand feet high make the monument one of outstanding scenic beauty. A highway winds for twenty-two miles along the canyon rims, providing spectacular views. Among the mammals of Colorado National Monument there are bison, elk, gray fox, coyote and mule deer. Because the country is semi-arid, there are no tall forests, but on the escarpments there are stands of piñon pine and juniper. In spring there are wild flowers in the canyons and on the tablelands.

The monument is under the direct supervision of the Superintendent of Mesa Verde National Park, who is represented at the monument by a year-round resident custodian in charge. The address is Fruita, Colorado. There is a free campground on the reservation, and other accommodations are available at nearby towns. The eastern entrance to the monument is four miles from Grand Junction, Colorado, located on U. S. highways 6, 24, and 50, and the northern entrance three and a half miles from Fruita on U. S. highways 6 and 50, making the monument easily accessible to transcontinental travel. It is open all year.

CRATERS OF THE MOON NATIONAL MONUMENT, in southern Idaho, was established in 1924. There is no other area so small in size where as many volcanic features can be seen. It consists of seventy-four square miles of craters, cinder cones, lava flows, caves, tunnels formed by lava flowing under a hard crust, and other phenomena that make the area resemble the moon's surface as seen through a telescope. In the caves and tunnels there are red and blue stalagmites and stalactites. Most of the area is without vegetation except for lichens. On some of the lava flows there are a few small pines, shrubs, grass and flowering plants. The area is noted for its weird and unearthly appearance, as well as for its geological interest.

Headquarters is at Arco, Idaho. The monument is reached over U. S. Highway 20 west from Idaho Falls, a distance of 107 miles, and east from Boise over the same route, a distance of 187 miles. For those who bring their own equipment, there is a campground at the monument. Cabins are also available. The monument is open during the summer months.

DEATH VALLEY NATIONAL MONUMENT, in eastern California and southwestern Nevada, was established in 1933. Comprising an area of 2981 square miles of desert country, it is the fifth largest area under National Park Service administration. From north to south the monument extends 140 miles. Lying between barren, splintered mountain ranges, the Amargosa Range on the east and the Panamints on the west, it is an unspoiled landscape rich in esthetic appeal and scientific interest. The geologic formations, varying from salt flats to volcanic craters and jagged peaks, range in color from white through reds and earth colors to nearly black, which, when touched by the desert sunsets, turn to blazing orange, red and purple contrasted with shadows of brilliant blue. On infrequent days of atmospheric haze the colors are softened to pastel shades that fade in the distance to blend with the sky. The lowest point in the United States is in the valley. This spot, near Badwater, is about 280 feet below sea level. Fifteen miles west of Badwater on the skyline of the Panamints rises Telescope Peak, the highest point in the monument, 11,325 feet above the lowest point. In winter, snow caps the Panamint ridge, while in the valley, from late October to May, the climate is mild. In early times, Death Valley won fame for its summer heat, and this fact is shown by its name. Explorers and travelers, caught here without water, perished in the heat. The highest temperature recorded is 137° in the shade.

Some of the important points of interest within the monument are Dantes View, the crest of the Panamints, Titus Canyon, Ubehebe Crater, Chloride Cliffs, Sand Dunes, Mosaic Canyon and Badwater. Geologists believe that the valley was formed by fracturing and folding of the earth's surface. A geologic study of the area, as yet incom-

plete, should reveal more important facts about its formation. Fossilized footprints of prehistoric species of carnivores, camels, horses, antelopes and wading birds have been found in the Salt Creek Hills. Present-day mammals include jack rabbit, badger, gray and kit foxes, coyote, desert bighorn sheep, antelope ground squirrel, wood and kangaroo rats, pocket gophers and pocket mice. Horned toads and lizards, including the large chuckawalla, also inhabit the monument. Among the birds there are the desert raven, roadrunner, Gambel's quail, rock wren, killdeer, western meadowlark, Say's phoebe, and western mourning dove. There are eleven species of cacti including grizzly bear with bright yellow flowers, and beaver tail bearing rose-colored flowers. Other plants are the wetleaf, so named because its leaves are always moist; turtleback, a low-growing plant resembling a turtle and having gray leaves that give off an odor like turpentine; desert trumpet found on alluvial fans and having hollow stems that are expanded below the joints; bear-poppy with white blossoms and blueish leaves covered with long white hairs; several species of desert mariposas, and rocklady, which is found in Titus Canyon and nowhere else in the world. In late winter or early spring, when the season has been sufficiently wet, several plants appear that grow annually from seed. Among them are the curlybloom varying from purple to blue and white, Chinese-lantern with pink globe-shaped flowers, evening and sweet scented golden primroses and desert sunflower. There are eleven species of ferns in the mountains, and these include southern maidenhair and goldfern. Other plant life includes honey mesquite, screwbean, the bright green desert fir which is not a conifer, brittlebush, stingbush, paper-bag bush, desert holly and Death Valley sage. In the mountains at elevations over 5000 feet above sea level, there are western and Utah juniper, Rocky mountain maple, curlleaf, mountain mahogany, singleleaf pinyon, limber and bristlecone pines.

Human activity has made history in the valley. Pioneers arrived in the 1850s, and silver miners worked in the surrounding mountains in the 1860s; but the most important, perhaps, was the development of borax mining by two companies beginning in 1884.

Headquarters is within the monument. In winter it is located four miles north of Furnace Creek, and in summer on the Wildrose Canyon road. The address is Death Valley, California. Accommodations are available at Furnace Creek Inn from November 15 to May 1; and at Furnace Creek Auto Camp from September 15 to May 15. Emergency accommodations are available all summer at Stove Pipe Wells Hotel and Scotty's Castle. On the Trona-Death Valley road, near summer headquarters, there are cabins, a restaurant and a store. For those who bring their own equipment, there are several campgrounds. The monument is reached over U. S. Highway 6 north from Los Angeles to Johannesburg where a road branches east to Trona and the monument. From Reno and Carson City, Nevada, it is reached over U. S. Highway 395 south to the junction with U. S. Highway 6 at Bishop, California, and south from there to two miles south of Lone Pine where State Route 190 branches east to the monument. On the east the monument is reached over U. S. Highway 95 north from Las Vegas, Nevada, and south from Tonopah, Nevada, to Beatty, Nevada, at the junction with State Route 58 which leads to the monument. The Union Pacific Railroad leaves visitors at Las Vegas where cars are available. The monument is open from November 1 to May 1.

DEVIL POSTPILE NATIONAL MONUMENT, located in eastern California, is just south of Yosemite National Primeval Park and comprises an area of a little over one square mile. It was established in 1911 to preserve basaltic rock formations of blue-gray hexagonal columns forming a cliff sixty feet high and 300 yards in length. The columns, some vertical, some curving, some radiating from a common center and others slanting, are the result of cooling during a period of volcanic activity. Probably as long ago as 200,000 years, a thousand foot-thick glacier forced itself down the canyon of the Middle Fork of the San Joaquin River where its course was

blocked by the basaltic mass. This the glacier carved away, exposing the columns. Broken pieces of columns form a talus slope at the base of the cliff. One of the beauty spots of the reservation is Rainbow Falls on the San Joaquin River. The monument is in the Sierra Nevada at an elevation of 7600 feet, and is surrounded by the Sierra National Forest.

The area is under the care of the superintendent of Yosemite National Primeval Park. Visitor accommodations are provided at Red Meadows Lodge, just outside the monument boundary. Here also are cabins, a store and a campground. A second campground is situated inside the monument. U. S. Highway 395 south from Reno and Carson City, Nevada, and north from Bishop, California, joins a branch road at Mammoth Lakes, California, which goes to the monument. At present this branch road is narrow, steep and winding, and is in bad condition. The monument is open from July to October.

DEVILS TOWER NATIONAL MONUMENT, in the northeast corner of Wyoming, was created in 1906, the first of our national monuments. Comprising an area of almost two square miles, its chief feature is the 865 foot flat-topped rock called the Devil's Tower. Geologists say that the tower was formed by a stream of molten rock that, in pushing upward, came to a hard layer of the earth's crust and was forced into a dome-shaped mass. In cooling, this mass cracked into vertical columns that eventually were exposed through erosion. The fluted tower is a remnant of the dome. Most of the columns that form the flutings are pentagonal and average ten feet in diameter, while the tower measures 1700 feet in diameter at the base. The color of the rock is light gray and buff, and is partly covered with lichens. The oval top, inhabited by chipmunks and other rodents and birds, comprises one and a half acres, on which grow moss, grass, ferns and sage. Near the top of the sheer sides are nests of the prairie falcon. A colony of prairie dogs in the monument near the Belle Fourche River attracts the attention of visitors. The tower, which rises from a rolling landscape that is partially covered with a forest predominantly of ponderosa pine, is encircled at its base by a trail.

Headquarters, museum, campground and picnic area are located at the foot of the rock. The address is Devils Tower, Wyoming. There are tourist cabins nearby. The monument is reached over U. S. Highway 14 west from Rapid City, South Dakota, 111 miles to a junction with Devils Tower Road. From the west it is reached over the same highway from Sheridan, Wyoming, 160 miles to the Devils Tower road. The monument is open all year.

DINOSAUR NATIONAL MONUMENT, located in northeastern Utah and northwestern Colorado, was established in 1915, setting aside eighty acres for the protection of a rich deposit of fossil bones of prehistoric animals. In 1938 the monument was enlarged to 327 square miles to include some of the most spectacular canyon country

At Dinosaur National Monument in Utah, the huge fossil thigh bone of a dinosaur is being lifted from the quarry which is a veritable prehistoric Noah's Ark.

Carnegie Museum



in the United States. By the slow tilting of the rock masses, the dark sandstone containing the dinosaur fossils was tipped and eroded into view. The dinosaurs inhabited this section of the country approximately 200 million years ago. Scientists believe that this deposit represents a sand bar of an ancient river and that the bodies of dinosaurs, dead from many causes over a period of time, were washed onto the bar by the river. The bones were covered with sand and replaced by the rock-making mineral, silica, becoming in time rocks themselves. This deposit was discovered in 1909 by Dr. Earl Douglass of the Carnegie Museum, Pittsburgh. Twenty-three skeletons have been removed from the quarry by the Carnegie Museum, the Smithsonian Institution, Washington, D. C., and the University of Utah, Salt Lake City. Assembled dinosaur skeletons are on display at these institutions, as well as at the Colorado Museum of Natural History and at several other museums throughout this and other countries. The dinosaur bones within the monument represent twelve species ranging from small ones no larger than a cat, to the mighty brontosaurus or thunder lizard that probably weighed forty tons. One skeleton of the brontosaurus at the Carnegie Museum measures eighty feet in length. The stegosaurus with armor plating, a crest of plates three feet high on its back and yard-long spines on its tail, has been found here, as well as an allosaurus, a fierce, carnivorous dinosaur whose huge jaws were filled with long, sharp teeth having serrated edges like a bread knife. In addition to the dinosaur bones, the fossils of crocodiles, turtles, shells, cycads, leaves and petrified wood have been found.

Although there is not yet an assembled skeleton at Dinosaur National Monument, the National Park Service plans to explore the fossil-bearing layer to uncover specimens which can be exposed in high relief as an exhibit-in-place. Using this as the feature exhibit, a modern museum building is to be constructed over the face of the quarry, and accessory exhibits such as dioramas, mounted and assembled materials, paintings, charts and transparencies will be used for presentation.

Most of the scenic part of the monument, when made accessible, should provide a great deal of interest to visitors. The Yampa River, entering from the east, is a fast flowing stream with rapids, bends and ox-bow, and it has cut an awe-inspiring canyon in places over 1600 feet deep. Entering from the north, the Green River flows through the wild, spectacular canyon of Lodore. A number of Indian caves and rock-shelters are situated in the canyon walls. On the plateaus and mountain slopes of this semi-arid country grow sage, serviceberry, ponderosa pine, Douglas fir, quaking aspen and mountain mahogany. At lower elevations there are shad-scale, greasewood and sage interspersed with pinyon pine and juniper. The canyon bottoms have streambank forests of cottonwood, boxelder, choke-cherry, squawberry and sage, the latter growing taller than a man on horseback. Wild flowers on the reservation include sego lily, desert mallow, sunflower, evening primrose, fritillaria, goldenrod, monkey flower, purple vetch and purple and yellow bee weed. Among the mammals are mule deer, bighorn sheep, black bear, mountain lion, coyote, bobcat, cottontail and jack rabbit, badger, beaver, prairie dog, weasel, bushy-tailed wood rat, and the golden-mantled ground squirrel. Horned toad, several species of lizards and an occasional snake are present. Birds include the golden and bald eagle, most of the larger hawks, western horned owl, sage grouse, a host of smaller birds such as the goldfinch, lazuli bunting, long-tailed chat and chickadee. Canada geese nest on islands in the river.

Headquarters is within the monument, seven miles north of Jensen, Utah, on U. S. Highway 40. The address is Jensen. There are no accommodations within the reservation, but they are available at Vernal, Utah, twenty-one miles from headquarters west of the monument on U. S. Highway 40. The monument is reached over U. S. Highway 40 west 381 miles from Denver, Colorado, and east 200 miles from Salt Lake City, Utah.

FOSSIL CYCAD NATIONAL MONUMENT, an area of one half square mile, is located in the southwest corner of South Dakota. It was created in 1922 as a research

national monument because of the remains of fossilized plants, or cycads, embedded there. The plants, which resembled tree ferns, grew millions of years ago during the Mesozoic period when dinosaurs inhabited the earth. As early as 1900, fossil tree trunks were discovered in the monument area, and further investigation brought to light fossilized leaves and buds of the cycad. This monument is not open to the general public, but specimens of the beautiful and delicately formed cycads are on exhibition at Wind Cave National Park and at the National Museum, Washington, D. C. The fossils are not exposed at the monument, but lie underground. Digging is not permitted except by special permission of the National Park Service. The superintendent of Wind Cave has charge of this area, which is situated twenty-five miles southwest of Wind Cave National Park near Minnekahta, South Dakota, and fourteen miles southwest of Hot Springs, South Dakota, just off U. S. Highway 85A.

GLACIER BAY NATIONAL MONUMENT, on the coast of southern Alaska, was created in 1925. Nearly an untouched wilderness, it consists of 3590 square miles of snow and ice-capped mountains and arms of the sea. Because of its large receding glaciers, it provides opportunity for study of post glacial establishment of flora and fauna. At the foot of some of the glaciers the ground rock and lateral moraines are slowly being exposed as the great ice walls melt back a little each year. In places that have been exposed for a time, trees and other vegetation are slowly taking over, while in areas longer exposed, dense forests have become established. Among the important tree species are Sitka spruce, of which there is a fine stand, Douglas fir, western hemlock, mountain hemlock and alpine fir. The largest glacier is Muir Glacier, named for the naturalist John Muir, who did considerable exploring in the region. The higher peaks are Mount La Perouse, Mount Fairweather, Mount Lituya, Mount Crillon and Mount Quincy Adams. The monument is bordered on the north by the Province of British Columbia and on the south by Icy Strait and Cross Sound. The Alaskan brown bear, largest North American carnivore, and the black bear inhabit the monument. Thousands of Canada geese nest on the Gustavus Point area of the reservation.

The regional director of Region Four, National Park Service, San Francisco 5, California, is in charge of the monument. Although the National Park Service intends to make the area accessible to visitors, no access has yet been provided.

GRAND CANYON NATIONAL MONUMENT, in northern Arizona, is adjacent to Grand Canyon National Primeval Park on the west, and comprises an area of 305 square miles. The canyon in the monument is considerably narrower than that in the park, and outstanding features are the lava flows that poured over the canyon's rim damming the river during a period of volcanic activity. Wildlife, plant life, coloring and general appearance are similar to those of the park. The monument is administered by the superintendent of Grand Canyon National Primeval Park. It is not yet accessible to the general public.

GREAT SAND DUNES NATIONAL MONUMENT, in south central Colorado, consisting of fifty-seven square miles of sand dunes, was established in 1932. Carried by the prevailing westerly winds, the sand has been heaped up along the west base of the Sangre de Cristo Mountains to form the largest dunes in the United States. Nearly a thousand feet high, these rippled, brownish gray silica dunes offer a striking contrast to the forest-covered, snow-capped mountains that rise 14,000 feet above sea level. Mount Cleveland, the highest peak in the range, stands directly behind the dunes. To the west across the San Luis Valley in which the dunes are located, are the La Garita and San Juan ranges. Geologists say that the Sangre de Cristo Mountains comprise a fault-block, earth-forces having broken and lifted them upward from the level of the valley floor. At one time the valley was filled with a lake, but this later drained off through a channel on the south, and today the valley is semi-arid. Flowing from



Natt N. Dodge

The Great Sand Dunes, heaped along the base of Colorado's Sangre de Cristo Mountains, raise their shifting crests almost a thousand feet above the valley floor.

the snows of the high peaks is the Medano River. This stream skirts the dunes for several miles, finally disappearing into the sand. Near the southwestern edge of the dunes are a pond and springs believed to be the re-emergence of the water of the Medano. During migration, large numbers of ducks visit these waters. The only plant life in the dunes is a species of sunflower that grows in moist depressions.

The monument is under the care of the regional director, Region Three, National Park Service, Santa Fe, New Mexico. There are no visitor accommodations in the monument, but these are available at nearby towns. The reservation is reached from U. S. Highway 160 at Alamosa, Colorado, then north over State Route 17 to Mosca, and from there over State Route 150 east to the monument. The monument is open all year.

JACKSON HOLE NATIONAL MONUMENT adjoins the eastern and northern boundaries of Grand Teton National Primeval Park and is six miles south of Yellowstone National Primeval Park in northwestern Wyoming. It was established in 1943, and comprises an area of 346 square miles of sage flats, forests, grasslands and lakes. Although essentially level, the area contains buttes and glacial moraines. The largest lake in the monument, Jackson Lake, on the Snake River, is dammed at its outlet and the water used for irrigation down stream. The Snake River winds through the monument from north to south, and is joined by the Buffalo Fork in the north, and by the Gros Ventre River which flows across the south end of the monument. Jackson Hole is hemmed in by two ranges of mountains. On the east are the Gros Ventre Mountains, partly forested, and having gentle, rounded outlines. On the west rises abruptly the jagged, pale gray Teton Range, in Grand Teton National Primeval Park, forested on its lower slopes and rising far above timber line to a height of 13,766 feet above sea level and standing more than 7000 feet above the floor of Jackson Hole.

Geologically this valley is called a fault-trough, while the Teton Mountains are known as a fault-block range. In early geologic times, a fracture developed in the earth approximately along the western edge of the valley. The land on the west side was lifted to form the Tetons, while that on the east was lowered. Geologists are able to study here the activities of ancient glaciers believed to have descended into the valley at three different times, over a period as long as two million years. Among the mammals are the moose, elk, coyote, black bear and beaver, while included among the birds are Wilson snipe, Lincoln sparrow, hermit thrush, Barrow's golden-eye duck, trumpeter swan and sage grouse. Important tree species are the whitebark, limber and lodgepole pine, Engelmann and Colorado blue spruce, alpine and Douglas fir, cottonwood and quaking aspen. Some of the several hundred flowering plants are the balsam root, scarlet gilia, larkspur, wild buckwheat, Indian paintbrush, lupine, pentstemon, purple fringe, bitterbrush, service berry, honeysuckle and mountain balm.

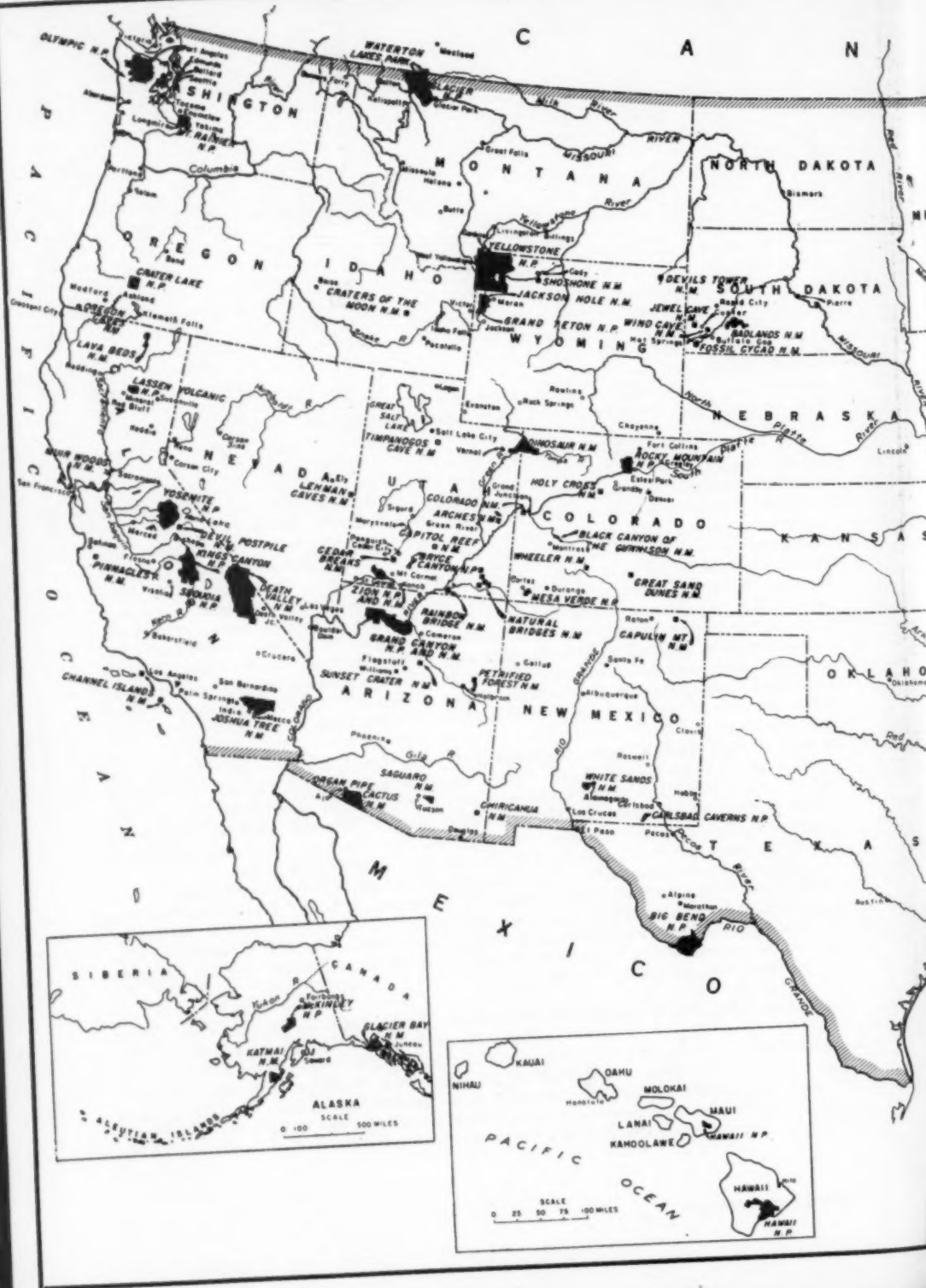
Cattle grazing is now permitted in the monument, but when this is eliminated, the vegetation along cattle driveways will be restored. An area of 1200 acres near Moran, within the monument, is being developed by private interests as a paddock wherein elk, deer, antelope and moose will be fenced. Such an artificial development is inconsistent with the purpose of a great national monument of this character. Furthermore, it is contrary to National Park Service policy, since it is the Service's expressed intention that "presentation of the animal life of the parks to the public shall be a wholly natural one."

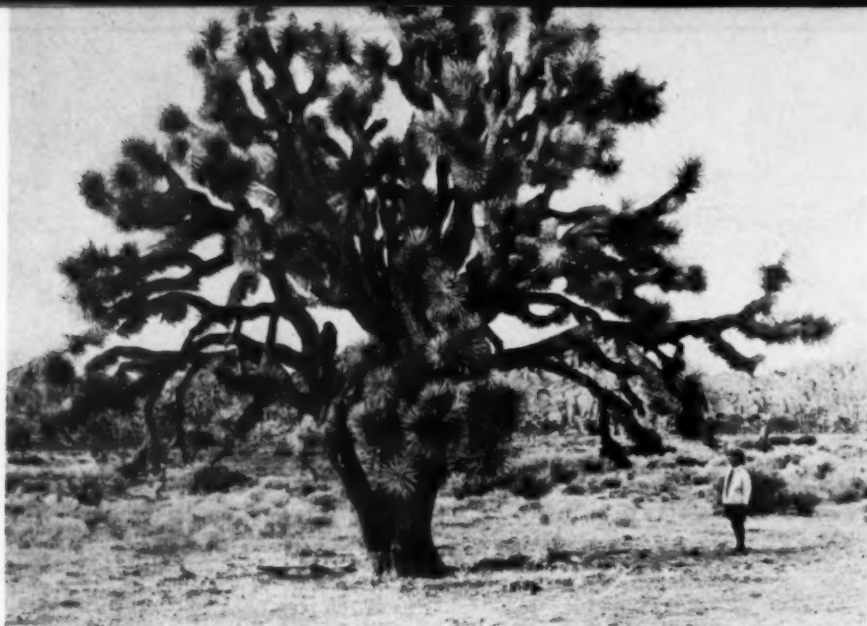
The monument is administered jointly with Grand Teton National Primeval Park, and the headquarters address is Moose, Wyoming. Accommodations are available at numerous ranches throughout the monument and at a hotel in nearby Jackson. The monument is reached over U. S. Highway 89 south from Yellowstone National Primeval Park and north from Ogden and Logan, Utah; also over U. S. Highway 287 from Rawlins, Wyoming. East from Victor, Idaho, State Route 22 runs to Jackson via scenic Teton Pass. Yellowstone Park Company busses provide service between Yellowstone, Grand Teton and the monument. There is also bus service from Victor to Moran in the monument. The Union Pacific Railroad leaves visitors at Victor and at West Yellowstone, Montana, and the Northern Pacific at the Gardner entrance of Yellowstone Park; while the Chicago, Burlington and Quincy leaves visitors at Cody, Wyoming, whence there is bus service to Yellowstone Park. The monument is open from June 15 to September 15.

JEWEL CAVE NATIONAL MONUMENT, in southwestern South Dakota, was established in 1908. It consists of a little over two square miles, having as its chief feature a limestone cavern with walls encrusted with glittering spar calcite crystals. The cavern is made up of many rooms connected by passages with side galleries. One of the passageways is inhabited by a colony of lumpnosed bats. The area above ground contains one of the finest remaining stands of ponderosa pine in the Black Hills.

The monument is under the care of the superintendent of Wind Cave National Park. The address is Hot Springs, South Dakota. It is reached on U. S. Highway 16 fourteen miles west of Custer, South Dakota, and twenty-three miles east of Newcastle, Wyoming. The Chicago, Burlington and Quincy Railroad serves Custer. There is a campground in the monument, while other accommodations are available at Custer. The cave is open daily from June 1 to September 30.

JOSHUA TREE NATIONAL MONUMENT, in southern California, was established in 1936 to preserve part of the Mojave and Colorado deserts. Comprising an area of 1344 square miles, one of its chief features is a stand of the large yucca known as the Joshua tree. Throughout its limited range in this part of California, western Arizona, Nevada and southern Utah, the Joshua tree is diminishing because of cattle grazing and because commercial uses are being made of its fibers. The stand within the monument is unspoiled and deserves the protection now afforded it. This tree, one of the





George A. Grant

Joshua Tree National Monument, in California's Mojave Desert, established to protect a stand of the weird Joshua tree, is today in danger of despoilment.

weirdest species of North America's flora, attains heights up to forty feet. Its foliage consists of dense clusters of stiff, dull green, sharp-pointed leaves, and its blossoms, large heads of creamy white flowers appearing in spring, are borne at the branch terminals. The monument's mammals are the desert bighorn, mule deer, coyote, badger, bobcat, kit and gray fox and jack rabbit.

Parts of the monument, as originally established, contain no Joshua trees and here mining and other commercial activities have disturbed the primeval desert. A bill to exclude these tracts from the monument was introduced but not passed in the 79th Congress. Such exclusion would be desirable, since disturbed areas do not belong within a national monument of this character. Joshua Tree National Monument has been faced with two serious dangers. The heart of the monument, the Joshua tree forest, is still checkerboarded with privately owned lands. Since Congress failed to appropriate funds for their purchase by the federal government, the owners may sell to buyers whose interests will run counter to the nature preservation concept. This could result in the despoilment and loss of the monument. A second danger lies in the fact that mining interests covet the entire area. If this esthetically and scientifically important monument is to be preserved intact, it may require the combined force of thinking Americans demanding that Congress appropriate funds for federal acquisition of the private in-holdings.

Headquarters is at Twentynine Palms, California. Accommodations are available at Twentynine Palms, Joshua Tree, Yucca Valley, Palm Springs and Indio. There are none at the monument. The area is reached over U. S. Highway 66 east from Barstow and west from Needles, California, to Amboy, where a side road runs southwest forty miles to Twentynine Palms. It is reached also over U. S. highways 60, 70 and 99 east from Los Angeles and Riverside to White Water where a road leads to the monument entrances at Twentynine Palms and Joshua Tree; and west from Phoenix, Arizona, and Blythe, California, over the same route to Indio. Summer visitors should

inquire of local travel agencies as to road conditions, because flash floods from thunderstorms frequently wash out sections of the road. The Southern Pacific Railroad serves Indio. The monument is open all year.

KATMAI NATIONAL MONUMENT, located on the southeast coast of the Alaska Peninsula, was established in 1918. It consists of 4214 square miles, and is the largest area administered by the National Park Service. Chief features are the crater of Katmai Volcano and the Valley of Ten Thousand Smokes. The region was explored by expeditions sent out by the National Geographic Society shortly after the eruption of Katmai in 1912, one of the half dozen most violent during recorded history. A brief eye-witness account by a native of Savanoski village, twenty miles north of the volcano, describes the flight of the villagers by boat to Naknek in the darkness caused by the clouds of hot, falling ash. Kodiak, a hundred miles away, was buried under a foot of ashes. The concussion of the eruption was audible 750 miles away and, throughout the northern hemisphere, the sun was dimmed for months by the dust. The crater of Katmai is eight miles in circumference and contains a mile-wide lake of milky blue water with a crescent-shaped island of forty acres. Five miles northwest of the volcano lies the Valley of Ten Thousand Smokes. When discovered in 1916, this area, about the size of the District of Columbia, contained millions of steam jets, some rising more than a thousand feet. The valley was filled by a flow of incandescent pumice, sand and ash a cubic mile or more in volume. Today the volcanic activity of the valley has largely died down, although the volcano, Mt. Mageik, located within the monument, is active. The monument lies at the Arctic edge of the coniferous forest where white spruce predominates. Other tree species are balsam poplar, paper birch, quaking aspen and cottonwood. The mountain and lake scenery is unsurpassed. Most noteworthy of the mammals of the monument is the Alaska brown bear, the largest North American carnivore. Also inhabiting the monument are the moose, caribou, elk, red, cross and silver fox, wolverine, wolf, marten, mink, otter, beaver and lynx. Ducks, geese, swans, loons and grebes inhabit the lakes and streams, while the forests and grasslands provide habitat for Steller jay, northern shrike, red crossbill, arctic three-toed woodpecker, robin, golden-crowned sparrow, varied thrush and grouse. Salmon occur in great numbers and breed in the lakes. Over many square miles beyond the forest border, the ground is covered by a rich growth of native red top grass which stands seven feet high.

The monument is administered through the superintendent of Mount McKinley National Primeval Park, Alaska, and has not yet been made accessible to visitors.

LAVA BEDS NATIONAL MONUMENT, in northern California, was established in 1925 to preserve an area of seventy-one square miles of volcanic formations. The most recent activity is believed to have taken place 5000 years ago. Within the area are numerous caves, or lava tubes, formed when the surface of lava flows cooled and solidified, while the inner liquid continued to flow and seep away, leaving the hollow tube. The roofs and sides of these tubes vary greatly. Some are the color of chocolate, and are covered with drippings that form strange patterns. In places the walls are lined with shelves and ripples. Skull Cave contains a small room that is floored with ice. The entrance to this cave is big enough to hold a large house, while the roof of Catacomb Cave is so low that one can reach up and touch it in many places. Fern Cave, the walls of which are adorned with ancient Indian paintings, has a garden of ferns and mosses on its floor, although these plant forms occur nowhere else in this semi-arid region. Other caves with descriptive names are Indian Well Cave, Silver Cave, Dragon's Head and White Lace Cave. About 130 caves have been explored. The monument varies from 4000 to 5000 feet above sea level and comprises a remarkably rugged and broken terrain. In the monument there are also cinder cones, spatter cones or chimneys, two lava fields—the Black Lava Flow and Devil's Homestead; and there are several natural bridges as well as several buttes. Besides the geologic features, the area contains a varied mammal

and bird population, while the plant life is equally varied. Thousands of Rocky Mountain mule deer winter on the reservation. Other mammals are the coyote, bobcat, badger, porcupine, jack rabbit, ground squirrel and chipmunk. The Lava Beds bighorn sheep once lived here, but is now extinct. Among the birds there are the California and mountain quail, mourning dove, green-tailed towhee, Audubon's warbler, Pacific night-hawk, California jay, several species of hummingbirds, flycatchers, linnets, hawks and owls. Trees are chiefly the fragrant western cedar and the ponderosa pine. Shrubs include such species as bitter bush, sage, mountain mahogany, and the fern bush which has lacy, fragrant leaves and white flowers. Smaller plants are the California poppy, Indian paintbrush, wild flax, pentstemon, sulphur flower and the pale lavender mariposa lily. In a small disconnected part of the monument known as Petroglyph Cliff, there are hundreds of prehistoric petroglyphs or pictorial carvings. In 1872-73, the Modoc War, one of the last stands of the Modoc Indians against the white men, took place here. The Indians, making use of caves and fissures providing almost impregnable fortifications, were able to inflict severe losses upon the white man's forces.

Headquarters is within the monument, and the address is Tulelake, California. There are campgrounds in the reservation. Other accommodations are available at Klamath Falls and Merrill, Oregon, and Tulelake. The monument is reached south from Klamath Falls over State Route 39, and north from Canby, California, on U. S. Highway 299 where State Route 39 branches north to the monument. Lava Beds is situated about midway between Crater Lake and Lassen Volcanic national primeval parks. When overnight accommodations have been established at the monument, and the roads within the monument have been improved, the area will provide a logical stopover and a point of high interest for tourists traveling between these two parks. The monument is open all year.

LEHMAN CAVES NATIONAL MONUMENT, in eastern Nevada, was established in 1922. Comprising an area of one square mile, its chief feature is a limestone cave discovered by Abe Lehman in the early 1870's. The cavern, surrounded by the Nevada National Forest, is located on the eastern slope of Wheeler Peak, 13,058 feet, highest in the Snake Range. The cave is about 7000 feet above sea level in the belt of pinyon pine and juniper where, even though surrounded by one of the most arid regions of the United States, mountain streams flow all year. The geologic setting of the cavern is a metamorphic limestone probably belonging to the middle Cambrian Period. Hundreds of thousands of years ago water charged with carbon-dioxide seeped through cracks dissolving the limestone until the cracks widened into rooms and passages. In the cave are stalagmites and stalactites, drapery and ribbon-like formations and disks called tom-toms because, when struck, they resound like a drum. On the floors of the cavern are terraced pools with delicately formed dikes, while on the walls, ceilings and on some of the larger formations, there are incrustations of needle crystals and mushroom-like nodules of infinite variety. Coloring ranges from chocolate through buff to cream white. The trip through the cave over easy-graded trails, is a half mile. On the monument's above-ground area there are deer, mountain lion, coyote, owls and jays.

The monument is under the care of the superintendent of Boulder Dam National Recreation Area, Boulder City, Nevada, who is represented by a resident custodian with headquarters at Baker, Nevada. On the reservation a campground near headquarters has been provided for those who bring their own equipment. Hotels and other accommodations are available at Ely, Nevada. The monument is reached over U. S. Highway 6 about fifty miles east of Ely to a road that branches south near Sacramento Pass sixteen miles to the monument. From Hinkley, Utah, it is reached about one hundred miles west on the same route. The monument is open all year.

MUIR WOODS NATIONAL MONUMENT, comprising an area of two-thirds of a square mile, was established in 1908. The tract was given to the nation by the late

Congressman William Kent and his wife, Elizabeth Thatcher Kent, and was named for the naturalist, John Muir. Prior to establishment as a national monument, it was planned to log the area and use its canyon as a reservoir. Located near the California coast ten miles north of the Golden Gate Bridge, its chief feature is a grove of coast redwood trees, *Sequoia sempervirens*. This species is related to the sequoia, *Sequoia gigantea*, of Yosemite, Kings Canyon and Sequoia national primeval parks, but it differs from the latter in several respects. The foliage of the redwood somewhat resembles that of hemlock, while that of the sequoia is more like that of cedar. The redwood grows taller than the sequoia, many trees exceeding 300 feet, but it does not develop as large a trunk diameter. *Sempervirens* grows from sprouts or seeds, and it is not uncommon to see young trees growing in a circle that marks the base of an ancient monarch long since rotted away. In the monument the tall straight trunks of the redwoods are in striking contrast to the leaning, mossy trunks of bay, false nutmeg, tanbark oak, bigleaf maple and madrone with its bright colored bark and broad evergreen leaves. Other important trees of the reservation are Douglas fir and California buckeye, the latter forming a dense, rounded crown on which large, conspicuous spikes of white blossoms appear in summer. There are such plants as violet, shooting star, deer-tongue, oxalis, salal, clintonia, trillium, as well as azalea, sweet vernal or vanilla grass, and ferns of several varieties. Black-tailed deer, wildcat, raccoon and Douglas squirrel inhabit the forest. The varied thrush, Steller jay, Allen and Anna hummingbirds, California quail, winter wren, Marin chickadee and other avian species are found here. Along the floor of the canyon winds a stream and a broad trail with picnic areas at intervals. Other trails climb the forested canyon walls to the grassy wind-swept ridges above. Muir Woods is a superbly beautiful sylvan spot. On the monument's west, north and east borders it adjoins the much larger Mount Tamalpais State Park.

Headquarters is within the monument, and the address is Mill Valley, California. Lunches are available within the monument. There are no overnight or camping accommodations, and visitors leave before dark. No fires are permitted. The monument is reached from the north over U. S. Highway 101 to Mill Valley where a road branches southwest five miles to the monument. Coming north from San Francisco on U. S. Highway 101, a side road to the monument forks to the right three miles north of Golden Gate Bridge. Greyline busses take visitors from San Francisco to the monument. The reservation is open all year.

NATURAL BRIDGES NATIONAL MONUMENT, in the southeastern corner of Utah, was established in 1908. The monument, including four square miles in three disconnected areas, contains three sandstone bridges that are the result of stream erosion. The largest, Sipapu Bridge, is 222 feet above the stream bed, has a span of 261 feet, and is 128 feet wide and sixty-five feet thick at its smallest point. Kachina Bridge, the most massive of the three, has a span of 186 feet, is forty-nine feet wide and 107 feet thick at the smallest point, and stands 205 feet above the stream. Owachomo Bridge, the smallest, is 108 feet high with a span of 194 feet, thirty-five feet wide and ten feet thick at its center. Geologists say that these bridges were carved during centuries by running water, the bridges formerly having been solid walls located at sharp bends in the rivers where the constant grinding of sand-laden water swirled against them and wore them through. Besides these three marvelous examples of erosion, there are within the monument two large caves and a number of cliff dwellings. The latter, high in the walls of the canyon, are difficult to reach. The terminus of the road to the monument is at Owachomo Bridge. The other two bridges must be reached on foot or horseback, which involves a round trip of nine miles through spectacular country.

The monument is under the care of the regional director, Region Three, National Park Service, Santa Fe, New Mexico, who is represented by a resident ranger in summer. The address is Blanding, Utah. The monument is reached over U. S. Highway 160 from



George L. Beam

Sipapu Bridge, 222 feet above the stream bed of White Canyon, is the largest and most beautifully proportioned of the bridges in Natural Bridges National Monument, Utah.

north and east to Monticello, Utah, where State Route 47 runs south to Blanding, there joining the highly scenic State Route 95 that runs fifty miles to the monument. The monument is open in summer, and in winter when road conditions permit.

OREGON CAVES NATIONAL MONUMENT, established in 1909, is located at 4000 feet above sea level in the Siskiyou Mountains of southwestern Oregon, and is surrounded by the Siskiyou National Forest. Chief feature of the area are caves of winding passages and rooms with calcite formations. Believed to have been discovered by Elijah Davidson in 1874, the caves originated far back in geologic history. The region once was the bed of an ocean upon which was laid a deposit of lime. Hardening into limestone, this was later uplifted to form a range of mountains. Under great pressure and heat during this period, the limestone was changed to marble that was cracked in being raised. Water charged with carbonic acid seeped through the cracks, and then began the slow action of dissolving the marble. Gradually the cracks widened until the caverns were formed and the water, depositing the lime in solution wherever it dripped, built up the stalactites, stalagmites and other formations. The walk through the caverns extends a mile and a quarter. Although Oregon Caves lack the spectacular beauty and color of many other caves, the room known as Paradise Lost is outstanding. The floor space in this room is narrow, but the ceiling rises to a great height, and the walls are hung with fantastic head-like formations. The reservation includes two-thirds of a square mile. The forest of the area, with many fine trails, is composed of sugar pine, Douglas fir, western hemlock, madrone, tanbark oak, and rhododendron, that bears bright pink flowers in early summer. Wildlife includes black bear, mule deer, Steller jay, western tanager and many other species.

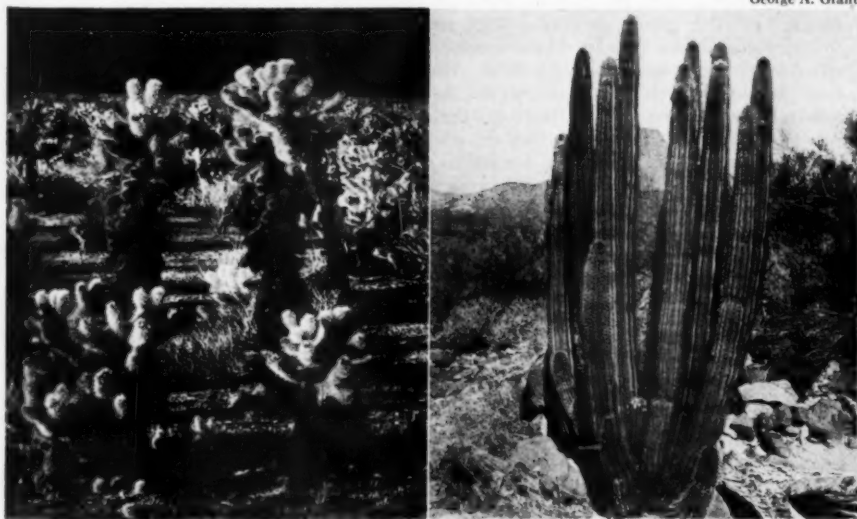
The monument is administered by the superintendent of Crater Lake National Primeval Park, who is represented by a resident ranger in summer. The Oregon Caves

Chateau, situated at the entrance to the caves, provides accommodations for visitors. There are no campgrounds on the reservation, but these are available nearby in the national forest. The monument is reached over U. S. Highway 199 north from Crescent City, California, and south from Grants Pass, Oregon, to Cave Junction, Oregon, where State Route 46 branches east twenty miles to the monument. The Oregon Caves Resort Company provides bus service between Cave Junction and the caves, making connection with the buses of the Pacific Greyhound Company during the summer travel season, and on call during the off season. The reservation is convenient for tourists traveling between Crater Lake National Primeval Park and California's redwood state parks. The monument is open all year, but guide service through the caves is provided only from May 29 to October 1.

ORGAN PIPE CACTUS NATIONAL MONUMENT, situated on the international border in southwestern Arizona, was established in 1937. The area comprises 516 square miles of Sonoran Desert with an unsurpassed desert flora as its chief feature. In addition, it has a faunal population of high esthetic and scientific interest. The country within the monument is dominated by five mountain ranges rising abruptly from the desert floor to splintered peaks with elevations of 5000 feet. The organ pipe cactus, for which the area is named, is one of the more abundant species found there. However, it grows only on south slopes, while the larger saguaro cactus is more abundant. The organ pipe has numerous ribbed and spined columnar branches that rise at or close to the ground and attain heights of from five to twenty-five feet. The flowers, which bloom at night, are borne near the upper ends of the columns, and generally range from brownish through green to white. Other cactus species are the night-blooming cereus, or *reina de la noche*, one or two and rarely eight feet tall, with large white flowers that are strongly perfumed, opening after sundown about the end of June or in July; the hedgehog cactus,

Teddy bear cactus (left) has blooms of green, yellow or white streaked with lavender, while the flowers of organ pipe cactus, opening at night, are brownish, green or white. Both species inhabit Organ Pipe Cactus National Monument, Arizona.

George A. Grant



forming clusters of cylindrical stems six to twenty-four inches high, thickly spined and bearing flowers with crimson petals and yellow centers; the *Wislizenius barrel cactus*, a comparatively large species that consists usually of a single ribbed stem from two to four and sometimes six feet high and from one to two feet in diameter, thickly spined along the ribs, and bearing orange-red or yellow flowers set in a ring on the apex of the plant. Cactus fruit, particularly of the latter species, provides food for several forms of wildlife. Crucifixion thorn, palo verde, creosote bush, ocotillo, ironwood, mesquite, bur-sage, catclaw, smoke tree and desert willow are other forms of vegetation in the monument. Among the mammals, there are desert bighorn sheep, gray and kit fox, jack rabbit, coyote, pronghorn antelope, Arizona whitetail deer, desert mule deer, burro deer and Mexican red deer, badger, peccary and coati-mundi. Among the birds are the white-winged, Inca and western mourning dove, Gambel's quail, canyon and cactus wren, phainopepla, Arizona cardinal, vermilion flycatcher, raven and roadrunner. Eagles and hawks are frequently seen.

Cattle grazing, which has no rightful place in any nature reservation, has not yet been eliminated from this monument, and is causing great damage. Such damage results in the breakdown of the larger shrubs and trees, and in the trampling of smaller vegetation, contributing to soil erosion.

Headquarters is at Ajo, Arizona, on State Route 85 eighteen miles from the monument entrance. There are no accommodations for visitors in the monument, but there are hotels, restaurants and cabins at Ajo and Gila Bend, Arizona. The monument is reached from Tucson, Arizona, over State Route 84 to Gila Bend, then south through Ajo on State Route 85, paved the entire distance; or over the more interesting, but only partly paved road west through the Papago Indian Reservation. From Phoenix and Yuma, Arizona, it is reached over U. S. Highway 80 to Gila Bend. The Southern Pacific and Santa Fe railroads serve Phoenix, and the Southern Pacific serves Tucson. The monument is open all year.

PETRIFIED FOREST NATIONAL MONUMENT, in eastern Arizona, was established in 1906. Comprising an area of 145 square miles, its chief feature is the largest and most colorful collection of petrified wood in the world, the remains of an ancient forest. Scientists believe that the trees of the forest belonged to the upper Triassic Period 160 million to 170 million years ago, when northern Arizona was near the sea. The trees died of natural causes and were transported by a stream into the flood plain. Here they settled in the sand and became waterlogged, eventually being buried beneath deposits of sand and shale which excluded oxygen, thus preventing rotting. In this way, there was sufficient time to permit petrification—the formation of carnelian, agate, jasper, onyx and opal. The petrified forest was discovered in 1851, but the area remained almost unknown until 1878. The Santa Fe Railroad, which runs through the reservation, was completed in 1883, and it was after that date that jewelers, gem collectors, souvenir hunters and manufacturers of abrasives began to carry off the petrified wood which served their needs because of its hardness, bright colors and ability to take a high polish. With one of the rarest exhibits of nature's handiwork in imminent danger of annihilation, the people of Arizona petitioned Congress to make a reservation of the area and place it under federal protection. Within the monument the remnants of trees lie scattered on the ground. There are the First, Second, Third, Rainbow, Blue and Black forests, varying in color, and these, together with a large part of the Painted Desert added to the monument in 1932, constitute a reservation of great scientific and esthetic importance. Agate House, an ancient Indian ruin in the monument, is an added attraction for visitors.

Although desert conditions prevail, several species of mammals inhabit the area. These include the pronghorn antelope, bobcat, badger, cottontail and jack rabbit, coyote, porcupine, prairie dog, spotted and Arizona skunk, fox, pack rat and antelope ground squirrel. Among the plants are golden sego lily, mariposa lily, yucca, globemallow,

Colorado four o'clock, evening primrose, several species of sage and five species of cactus. There are numerous shrubs, including black greasewood, skunkbush, rabbit bush andoneseed juniper.

Headquarters is in the monument, and the address is Holbrook, Arizona. There are two museums in the monument. Accommodations for visitors are provided at the Rainbow Forest Lodge and at Painted Desert Inn at the north entrance. There is also a campground for those who bring their own equipment and there are cabins near the south entrance. The monument is reached over U. S. Highway 66 east from Flagstaff, Arizona, and west from Gallup, New Mexico, the route passing through the monument. U. S. Highway 260, which joins U. S. Highway 66 at Holbrook, passes the south entrance nineteen miles southeast of Holbrook. The Santa Fe Railroad leaves visitors at Holbrook where cars are available for trips through the monument. The monument is open all year.

PINNACLES NATIONAL MONUMENT, in west central California, an area of twenty square miles of eroded domes, spires and caves of volcanic origin, was established in 1908. Formations rise to heights of from 500 to 1200 feet above the intervening canyons. A good trail system traverses the canyons, scenic cliffs and pinnacles, and winds up Chalone Peak, highest point in the reservation, 3287 feet above sea level. Digger pines grow along the dry, chaparral-covered slopes, and there are live oaks in the deep canyons and ravines. Wildlife includes deer, raccoon, gray fox, coyote, bobcat, ground squirrel, cottontail rabbit and pack rat, the latter occasionally making its presence known as it vibrates its tail against some object. Among the birds there are the duck hawk, prairie falcon, golden eagle, turkey vulture, California quail, white-throated swift, violet-green, tree and cliff swallow, California woodpecker, rock wren, western bluebird and white-crowned and golden-crowned sparrow.

Headquarters is in the monument, and the address is Pinnacles, California. The monument is reached over State Route 25 thirty-five miles from Hollister, California, on the north, and the same distance from King City, California, on the south. It is also reached over U. S. Highway 101 south from Salinas to Soledad and east on a branch road four miles to the monument. Cabins and meals are available at Pinnacles Lodge in the monument. The reservation is open all year.

RAINBOW BRIDGE NATIONAL MONUMENT is located in arid, scenic southeastern Utah within the Paiute Indian Reservation just north of the Arizona line. The area, consisting of a quarter square mile, was established in 1910 to protect the colossal arch rising 309 feet above the floor of Bridge Canyon. The arch, almost twice as high as Niagara Falls, is called *Barahoini* by the Paiute Indians, a word meaning "the rainbow" derived from its rainbow-like symmetry. The setting of Rainbow Bridge is spectacular. On either side, canyon walls of red sandstone tower to heights two or three times as great as that of the bridge itself. When seen from afar in the huge canyon, the bridge appears insignificant in size. The bridge was once a solid narrow wall at a bend in Bridge Creek. Through centuries of wearing by sand-laden water, the creek broke through the wall and took a short cut. For centuries more erosion widened the opening until only the top of the wall remained in the form of the arch.

The monument is under the care of the regional director, Region Three, National Park Service, Santa Fe, New Mexico. Accommodations for visitors are available at Rainbow Lodge, Arizona. From here the ten-mile horseback trip to the monument is made. Rainbow Lodge is reached over a road that branches east from U. S. Highway 89 at a point ten miles north of Cameron, Arizona, going through Tuba City and Tonalea, Arizona, and turning north six miles from the latter town to the lodge. The Santa Fe Railroad serves Grand Canyon National Primeval Park, and the Fred Harvey Company provides automobile service from Grand Canyon to Rainbow Lodge, a five-day round trip. The monument is open all year.



H. L. Shantz

The saguaro cactus, having large waxy white or cream colored blossoms with cupped centers of bright yellow anthers, forms stands as dense as forest trees.

SAGUARO NATIONAL MONUMENT, in southern Arizona, was established in 1933. Ninety-eight square miles in extent, its chief feature is a superb forest of the giant saguaro cactus, which has its range in southwestern Arizona and Sonora, Mexico. The plant, with its ribbed columns and thousands of spines, is slow in growth, and may reach a height of only three feet in thirty years, yet many specimens have attained heights up to fifty feet. The blossom of the saguaro, opening at night during May, has large waxy white to cream colored petals and a cupped center of bright yellow anthers. The flowers are borne in a mass covering the ends of the upward-reaching branches. Other species of cactus are prickly pear, consisting of spined pads that bear yellow flowers and edible fruits called "tunas;" hedgehog, consisting of small cucumber-like plants that produce crimson blossoms with yellow centers; barrel, resembling young unbranched saguaro six feet in height with yellow or orange flowers; and several species of cholla, sometimes called tree cactus, bearing yellow, red or orange flowers. Other plants of the area are palo verde, a small tree that has green bark, very small leaves and is covered with bright yellow flowers in spring; creosote bush; mesquite; ocotillo, a plant consisting of thorny whips eight to fifteen feet long that branch at the ground and which are tipped with scarlet flowers in spring; lycium, and franseria, a small plant with blueish-green pointed leaves resembling sage. Wildlife of the reservation consists of the coyote, desert mule deer, peccary, black bear, ringtail, gray fox, kangaroo rat, raccoon, jack rabbit, Harris ground squirrel and badger. The white-winged dove, Inca dove, Mexican ground dove, western mourning dove, and the elf owl, no larger than a sparrow, inhabit the monument. For nest sites the elf owl uses abandoned holes in the saguaro made by the gilded flicker and Gila woodpecker. Other birds are the cactus wren, the desert screech owl, several species of thrashers including the Crissal, Bendire's, and Palmer; also the white-

rumped shrike, Say's phoebe, Arizona crested flycatcher, Arizona cardinal, Scott's oriole, phainopepla, pyrrhuloxia and western mockingbird. There are several species of snakes including the red and black phases of the western red racers, several species of rattlesnakes and, at higher elevations, the kingsnake. Among the more common lizards are the black and pink Gila monster, the chuckawalla in rocky locations, the collared lizard and the desert scaly lizard.

Today the existence of the saguaro is threatened by the grazing of cattle which, on private and state owned unfenced lands within the monument, has not been eliminated. It is also threatened by a bacterium that attacks and kills the oldest plants. Aggressive public opposition to continued livestock grazing within the monument is necessary. The removal of livestock from the monument will permit restoration of conditions favoring the growth of new plants of this and other desert flora. However, since there has been no reproduction of the saguaro in the area for fifty years, it is believed by some authorities that the saguaro forest within the monument is doomed. Scientific study of the disease is being carried on by the University of Arizona and the U. S. Department of Agriculture in an effort to discover its cause and to bring it under control. The irrigation and cultivation of wide tracts of desert land, greatly increased during wartime, are factors that make imperative the preservation of typical Sonoran Desert areas like the Saguaro National Monument where at least a remnant of the original desert flora and fauna can be preserved for the enjoyment of future generations.

Headquarters is in the monument, and the address is Tucson, Arizona. There are no accommodations for visitors at the monument, but there are good hotels at Tucson. The reservation, open all year, is reached from Tucson via Broadway, a distance of seventeen miles. The Southern Pacific Railroad serves Tucson.

SHOSHONE CAVERN NATIONAL MONUMENT was established in 1909 to place under federal protection a crystal-encrusted limestone cave located high among the scenic cliffs of Cedar Mountain four miles southwest of Cody in northern Wyoming. The known length of the cavern is half a mile. Many crystals, mostly white, are of varied and interesting forms, but there are no large stalagmites or stalactites in the cave. The largest room in the cavern is forty feet wide and eight feet high. The surface area surrounding the cave's mouth is less than one half square mile. Administered jointly with Yellowstone National Primeval Park, the monument is located forty-nine miles from the Sylvan Pass entrance to the park on U. S. Highway 20. Shoshone Cavern is not open to the public.

SUNSET CRATER NATIONAL MONUMENT, in north central Arizona, was established in 1930. Comprising an area of four square miles, its chief feature is the volcanic cinder cone for which the monument is named. Geologists believe that the cone, 400 feet deep, a quarter mile across and a thousand feet high, may have been formed about 900 years ago and that there has been no activity in the region since that time. The crater's name is derived from the color of the cinders around the upper part, which have a reddish tint resembling the colors of a sunset, the lower part of the cone being dull black. At the west base there are four small, brightly colored spatter cones. The lava in the area bears the appearance of having cooled recently. Besides the cones and lava flows, there is an ice cave in which the air is cold the year around. The tree of the area is the ponderosa pine, a few of which grow inside the crater. In this unfavorable habitat, the tree is gnarled and does not reach its usual great size. Small plants with red flowers, the Arizona or red gilia, cover the cinder slopes.

The monument is administered jointly with Wupatki National Monument, and the address is Tuba Star Route, Flagstaff, Arizona. There are no accommodations in the monument, but they are available at nearby Flagstaff. The reservation is reached over U. S. Highway 89 twelve miles north from Flagstaff to a side road that branches east four miles to the monument. The Santa Fe Railroad serves Flagstaff. The monument, open

all year except when snow blocks the road in winter, is easily accessible to people driving their own cars to Grand Canyon National Primeval Park. Walnut Canyon and Wupatki national monuments, both containing Indian ruins, are nearby and should be visited on a trip to Sunset Crater.

TIMPANOGOS CAVE NATIONAL MONUMENT, in northern Utah, was established in 1922. It comprises an area of a little more than one-third of a square mile on the northwest slope of Mount Timpanogos in the Wasatch Mountains, and is surrounded by the Wasatch National Forest. Chief feature of the monument consists of three caves, Timpanogos, Middle and Hansen caves, 6776 feet above sea level, which are reached by a mile and a half of steep trails up the American Fork Canyon. Timpanogos Cave, electrically lighted, contains pink and white translucent limestone crystals and small pools of water in which the colorful stalagmites and stalactites are reflected. There are also helictites, formations of vine-like appearance varying from green, blue, lavender, buff and brown to red. This unusual coloring is the result of the presence of iron compounds. The caves, estimated to be 50 million years old, are faults widened by the dissolving action of water on the limestone. The dripping water, depositing the limestone in solution, created the formations. From the entrance of Timpanogos Cave there are wide views of the Wasatch Mountains and American Fork Canyon. Trees of the monument are white and Douglas fir, cottonwood, boxelder, oak and maple. Bears and deer live in the national forest, and may be seen occasionally by visitors to the monument.

Headquarters is within the reservation, and the address is Pleasant Grove, Utah. There is a picnic area in the monument. Other accommodations are available at American Fork seven miles away. Campgrounds are available in the national forest. The monument is reached over U. S. Highway 91 south from Salt Lake City and north from Provo to American Fork where State Route 80 branches east to the monument. It is reached also over U. S. Highway 40 west from Denver and Steamboat Springs, Colorado, to Heber, Utah, where U. S. Highway 189 branches southwest to a junction with State Route 80 at Wildwood. From Salt Lake City forty miles away, automobiles of the Grayline Bus Company and Utah Motor Tours, leaving at 9 a. m., bring visitors to the monument. The monument is usually open by May 1 and closed November 1.

WHEELER NATIONAL MONUMENT, located in the La Garita Mountains of southern Colorado, comprises a half square mile of volcanic remains and unusual erosion. It was established in 1908 and named in honor of Captain George Wheeler, U. S. Engineers, who in 1874 explored this part of Colorado under direction of the War Department. The area contains fantastic pinnacles and is cut with a maze of gorges. Its eroded mass of gray, brown and black basalt overlying a stratum of volcanic ash presents spectacular scenic beauty enhanced by dense forests of Engelmann spruce mixed with alpine fir. At 11,000 feet above sea level near the crest of the mountains, the reservation is surrounded by the Rio Grande National Forest. Rocky Mountain mule deer, elk and mountain lion are among the mammalian population.

The monument is under the care of the regional director, Region Three, National Park Service, Santa Fe, New Mexico. There is no road into the monument. Wagon Wheel Gap, served by the Denver and Rio Grande Railroad, is nine miles from the monument. The first three miles is by road, and the last six by trail up Bellows Creek. Creede, served by the same railroad, is eight miles away by trail. Guides, saddle and pack horses, camp outfits and supplies are available at Creede. At the monument there is a spring, and a shelter cabin for overnight campers. A fenced pasture is provided for horses. Wagon Wheel Gap and Creede are reached by road east from Durango, Colorado, over U. S. Highway 160 to South Fork, Colorado, where State Route 149 branches northwest seventeen miles. They are reached west from Walsenburg, Colorado, over U. S. Highway 160 to South Fork. The monument is open in summer, but opening and closing dates depend on snow conditions.



National Park Service

White Sands is a name well chosen, for these undulating dunes are as white as snow, being composed of gypsum, the material of which plaster-of-Paris is made.

WHITE SANDS NATIONAL MONUMENT, in southern New Mexico, was established in 1933. It comprises an area of 226 square miles of dunes, some of which are as high as fifty feet. The area is one of unusual beauty because of its pure white, glistening, wind-rippled gypsum sand. Chemically, gypsum is hydrous sulphate of calcium or, as the chemists express it, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. The grains of this sand are large and somewhat resemble granulated sugar or dry snow. Geologists explain that the origin of the dunes is gypsum washed down by seepage from surrounding mountains into the lowest point in the Tularosa Basin which is Lake Lucero on the edge of the dunes. When the water evaporates, the gypsum crystallizes as selenite. The selenite is then reduced to small particles by weathering, swept by the prevailing southwest wind and added to the dunes. Gypsum, also occurring beneath the floor of the Tularosa Basin, is brought to the surface by ground water through capillarity. When the moisture evaporates, gypsum particles remain and become part of the dune sands. These processes are continuing today. Since the monument includes areas beyond the white sand, mammals such as badger, gray and kit fox, coyote and jack rabbit are present. Some species of insects, lizards and mice found within the white sand area have developed pale or nearly white coloration, making them inconspicuous and protecting them from enemies. Plants able to adapt themselves to the gypsum are rabbit bush, Mormon tea, sand verbena, evening primrose, cottonwood and the creamy flowered yucca. As the dunes encroach, these plants grow long stems to keep their leaves above the sand. A museum occupying a wing of the administration building near the monument entrance, explains fully the origin of the dunes.

Headquarters is within the monument, and the address is Alamogordo, New Mexico. There are no accommodations at the monument, but they are available at Alamogordo, fifteen miles away on U. S. Highway 70, and at Las Cruces, fifty-four miles away on the same route. The Southern Pacific Railroad and Greyhound Bus Lines serve Alamogordo where the White Sands Service Company provides trips to the monument. The monument is open all year.

ZION NATIONAL MONUMENT, an area of seventy-six square miles, adjoins Zion National Primeval Park on the north and west. It was established in 1937 to protect eight canyons, of which Kolob is the largest and almost as spectacular as Zion Canyon itself. Wildlife, vegetation, geologic origin and coloring are in general similar to those of the national park. The reservation is close to U. S. Highway 91 about twenty miles south of Cedar City. It is administered jointly with Zion National Primeval Park, but has not yet been made accessible to the general public.

THIRTY YEARS OF SERVICE

By NEWTON B. DRURY, Director
National Parks Service

THE National Park Service this year celebrates its thirtieth anniversary.

In 1916, of course, the development of the National Park System had progressed far since that night in 1870 when explorers of the Yellowstone country decided to work for the establishment of a national park.

The law that brought Yellowstone National Park into being two years later, laid the foundation of a new pattern of land use destined to be applied not only to Yellowstone, but also to the other areas that Congress was to establish as national parks during the ensuing seventy-four years. The act that created the National Park Service placed upon the new agency the responsibility with respect to the national parks and monuments, "to conserve the scenic and historic objects and the wildlife therein and to make them available for public enjoyment in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." Though Yellowstone had remained the only national park for eighteen years, 1890 saw the establishment of Sequoia, General Grant (now part of Kings Canyon National Park), and Yosemite. The years that followed brought in Mount Rainier, Crater Lake, Mesa Verde, Glacier, Lassen Volcanic, Hawaii, Rocky Mountain and Wind Cave.

Congress alone can establish or abolish a national park. Since 1916 it has added fifteen more parks, greatly enriching a system already possessed of extraordinary distinction. Mount McKinley National Park, in Alaska, containing North America's highest peak, was the first addition after establishment of the Service. Grand Canyon, probably the most famous gorge in the world, became a park after eleven years as a national monument. Then came

Zion and Bryce Canyon, Carlsbad Caverns, Kings Canyon, Grand Teton, Olympic, and, newest of all, the mountain, desert and canyon country of Texas' Big Bend.

Especially noteworthy has been the extension of national parks east of the Mississippi,—Great Smoky Mountains, the biological and botanical wonderland in Tennessee and North Carolina; Shenandoah, a 100-mile section of Virginia's Blue Ridge; Mammoth Cave, Acadia, and the island wilderness of Isle Royale in Lake Superior.

The same period has seen the year-after-year employment, by every President from Theodore Roosevelt to Franklin D. Roosevelt, of the Antiquities Act, passed in 1906, to set aside distinguished scientific, historic and prehistoric sites as national monuments. Particularly in the Southwest has this authority been utilized to safeguard a wealth of prehistoric structures and artifacts.

Aside from the addition of national parks and monuments, progress has been attained along many different lines during the past thirty years.

There has been the development of a technical and administrative organization, comprising the headquarters office (temporarily in Chicago); four regional offices in Richmond, Virginia; Omaha, Nebraska; Santa Fe, New Mexico; and San Francisco, California—all established in 1937; and the superintendents and custodians of the individual areas with competent administrative, protective and interpretive staffs.

An interpretive program has been developed to enable park visitors better to understand the natural phenomena and the historic and prehistoric sites and objects in the system. Its main elements are research both within and without the Service, ranger-naturalist and ranger-historian serv-

ices, museums, and interpretive and informational publications.

Establishment of the George Washington, Colonial, Blue Ridge, and Natchez Trace Parkways are being developed. These are the beginnings of what may ultimately be a much more extensive parkway system.

Legislation has been passed authorizing National Park Service cooperation with other federal agencies and with state park agencies in selection of park and recreation areas and in helping to plan their development.

As the National Park Service nears the start of its fourth decade, it finds itself faced with a multitude of problems. Perhaps the most pressing is that of consolidating the properties in the National Park System by acquisition of the non-federal lands within their boundaries. These lands total some 625,000 acres. While it may take as much as \$20,000,000 to purchase all of them, doing so will be well repaid in the preservation of scenic, scientific and historic resources; in simplification of administrative control; and in permitting

needed developments that will otherwise be either impossible of accomplishment or much more expensive. Closely related to this is the necessity of making boundary revisions that will provide more satisfactory year-round wildlife habitats.

The Service is faced continually by pressures to open the reservations to such economic exploitations as the logging of forests; the harnessing of streams to provide power and irrigation; the extension of domestic livestock grazing; and the removal of mineral resources. When it is clearly proved that national need, rather than local desire for enrichment and exploitation, justifies the commercial utilization of these resources, it will doubtless be necessary to permit it, however regretfully. During the war, because the nation's needs required it, one park and one monument were opened to mining. The National Park Service is strong in its faith that, in safeguarding these priceless areas, it has a responsibility which will contribute to the physical well-being and the spiritual satisfaction of future generations.

ROOSEVELT PARK BILL VETOED

IN October 1945, Congressman Lemke of South Dakota introduced the bill H. R. 4435 to establish the Theodore Roosevelt National Park. Your Association, investigating the area's qualifications for national park status, found that the proposed reservation, already a federal wildlife refuge, did not measure up to the standards.

In August, just before the close of the 79th Congress, H. R. 4435 was passed by both House and Senate, and was submitted to the President for signature. On August 10, the President submitted to Congress a memorandum of disapproval that read in part as follows:

"The area that would be established by this bill as the Theodore Roosevelt National Park does not possess those outstanding natural features or scenic qualities that would justify its establishment as a national park and has

no direct historical association with Theodore Roosevelt . . .

"The land within the proposed national park is now a part of the Theodore Roosevelt National Wildlife Refuge, and is best fitted for use as a wildlife protection and management area . . . The area is largely of a badlands character, the formation being rounded, mostly dark red in color, and interspersed with grass-covered flats and plateaus.

"Existing or authorized national parks contain or relate to areas that possess scenic, scientific, or historic features of outstanding national significance. The same high standards should be maintained whenever national parks are established in the future. I feel strongly, therefore, that to confer national park status upon the area described in H. R. 4435 would be an unwise departure from sound policy . . . Accordingly, I am constrained to withhold approval from H. R. 4435."—Harry S. Truman.

Afield with the Association's Secretary

DURING July and August your Executive Secretary, accompanied by his wife, visited several state parks, national parks and monuments where, besides seeing the areas, he talked with concessionaires and Park Service personnel. In San Francisco he talked with officials of the Sierra Club and the Save-the-Redwoods League. In Canada he obtained a glimpse of a number of provincial and national parks and learned some of Canada's problems. At Calgary, Alberta, he met and talked with Mr. W. J. S. Walker, Executive Secretary of the National Parks Association of Canada. The following passages are from the diary of the trip in California and Oregon:

Muir Woods National Monument, July 9—The late afternoon sun made brilliant the hill country of southern Marin County as we dropped into the canyon of Muir Woods. . . . Entering the reservation on foot, we passed between the dense green domes of bay and buckeye, and came to the administration building under the redwoods. . . . Other visitors had departed, and in the silence of this forest of redwood, Douglas fir, bay, tanbark oak and azaleas in bloom, we were able to observe the birds and hear their calls. An owl swooped out of the dark tangle of foliage on the canyon side and alighted on a redwood branch above our heads. . . . It was night when I returned and made my way to the home of Superintendent Walter Finn and his wife. We talked for some time.

Redwood Highway, July 11— . . . The first of the California redwood state parks that we reached was Richardson Grove. It comprises a magnificent stand of redwoods, but it has been "developed" with cabins, a concession building, grocery store, open dance floor, baseball diamond, trailer camps and oiled roads—all on the roots of the trees. . . . Continuing north, we soon realized that Richardson is the only grove so despoiled. However, the

highway pierces the heart of nearly every one. To make the groves better fitted for esthetic appreciation, it may be necessary some day to reroute commercial traffic. . . . At Dyerville, headquarters for the redwood state parks, I talked with Superintendent Percy French.

July 12— . . . Toward the latter part of the afternoon we reached Prairie Creek Redwood State Park. Accompanied by Chief Ranger C. L. Milne, we hiked the Prairie Creek Trail through ferns and oxalis beneath the towering forest. . . . No sooner is the struggle won to save a grove, than there arises the task of protecting it. It is hard to say which is most difficult of achievement. . . . At Prairie Creek we enjoyed the hospitality of Ranger Milne and his wife.

July 13—This park is the home of one of the last remaining herds of Roosevelt elk. A group of bulls in the meadows near headquarters we photographed in color and in black and white. . . . At Mill Creek Redwood State Park we found Ranger Thole and his wife. Adjoining Mill Creek is the primeval wilderness of the National Tribute Grove, now in process of acquisition for state park administration. (See *The National Tribute Grove*, NATIONAL PARKS MAGAZINE, October-December, 1945.)

Oregon Caves National Monument, July 14—This morning we went through the caves. They are not impressive except for a few exhibits such as the Paradise Lost room and the Garden of the Gods. . . . Ranger Nitzel today became a sustaining member of the Association.

Crater Lake National Primeval Park, July 15—It is like winter here, and last night there was frost at headquarters. They say it is unusual at this time of year. The rim drive is mostly blocked by drifts, but Chief Ranger Carlisle Crouch drove us to where the plows were working. On the way back we saw a marten. Because of

trapping, this is now one of the rarest animals in the country. It finds a haven of safety in the park.

Lava Beds National Monument, July 17—We drove south early this morning, stopping near Crater Lake's south entrance to photograph the formations called the Pinnacles. . . . By mid-afternoon we had entered Lava Beds National Monument and after looking over the Devil's Homestead lava flow and exploring the weird Fleener Chimneys—two spatter cones—we drove on to headquarters where Custodian Don C. Fisher greeted us and invited us to spend the night with him and Mrs. Fisher. With two hours of daylight remaining, Mr. Fisher took us to see a number of caves or lava tubes . . .

July 18—This morning we again accompanied Mr. Fisher through caves and other wonders of the reservation. . . . A semi-arid region, the monument contains one of the most important exhibits of extinct volcanic activity in the country. In addition it has a flora and fauna of great variety, as well as the historic ground of the Modoc Indian War; yet, because the area has not been fully developed for visitor use, it remains almost unknown to the general public.

Lassen Volcanic National Primeval Park, July 18—It was afternoon before we left Lava Beds for Lassen. . . . We arrived in time to watch the sunset fade from Lassen Peak.

July 19—The new superintendent, Dan Tobin, invited us to see the park with him today. Under a brilliant sky we drove through the scenic Lassen Peak area and on to headquarters at Mineral. Here Ranger Schwartzlow discussed the park's master plans, and at my request, summed up the privately owned land problem. A number of tracts are in urgent need of federal acquisition . . .

July 20—This was another glorious day spent in the field with Superintendent Tobin.

Carson City, July 22— . . . I called on Mr. Robert A. Allen, Commissioner of Highways and Superintendent of State Parks. He told me briefly the story of the Nevada state parks. A few areas have been set aside, but there is need for expansion. There are no men in the field. A prerequisite here is a local group to urge park establishment. I expressed willingness to help Mr. Allen in any way possible . . .

Yosemite National Primeval Park, July 23— . . . At Mono Lake we turned west and climbed the Leevining Grade to Tioga Pass and the entrance to the park, 9925 feet above sea level. . . . It was raining, and the meadows here were full of Lyall lupines and Indian paintbrush—miniature plants in full bloom making a show of color. . . . The trip from here to the valley took half a day and revealed the vastness of this park . . .

July 21—Superintendent Frank A. Kittredge drove us, together with Justice and Mrs. Harold Burton, to Hetch Hetchy Dam. En route we passed through the Tuolumne Grove of big trees and the forest of sugar pine where grows the white Washington lily . . .

July 23—Administrative Assistant Ralph H. Anderson today drove us to Sentinel Dome, Glacier Point and the Mariposa Grove of big trees. . . . This was a day of brilliant sunshine spent amid the world's grandest scenery. . . . (Other days at Yosemite Valley were taken up with conferences and with seeing the several non-conforming developments in the valley. To Superintendent Kittredge, who is doing a magnificent job against tremendous odds, our hats are off. He needs help. To those who come to enjoy this spectacle of nature, the valley is a hodgepodge of beer joints, jazz, campgrounds, tennis courts, swimming pools, dining halls, roads jammed with traffic, swarms of people and plenty of noise. . . . In spite of it all, we had the thrill of seeing our first white-headed woodpecker and the lively Douglas squirrel.)

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